

# *Installation Manual*

## **DOPPLER SONAR**

### **DS-60**

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<b>SAFETY INSTRUCTIONS .....</b>	<b>i</b>
<b>SYSTEM CONFIGURATION .....</b>	<b>ii</b>
<b>EQUIPMENT LISTS.....</b>	<b>iii</b>
<b>1. INSTALLATION .....</b>	<b>1-1</b>
1.1 Display Unit DS-600 .....	1-1
1.2 Transceiver Unit DS-620 .....	1-4
1.3 Distributor Unit DS-610.....	1-5
1.4 Transducer .....	1-6
1.5 Junction Box DS-640 (option).....	1-16
1.6 Installation of Display Unit with DS-605 (Water Proof Box, option) .....	1-17
1.7 Remote Controller RD-501/Dimmer Controller RD-502 (option) .....	1-20
1.8 Rate-of-Turn Gyro DS-340 (option) .....	1-21
<b>2. WIRING .....</b>	<b>2-1</b>
2.1 Distributor Unit DS-610.....	2-2
2.2 Transceiver Unit DS-620 .....	2-5
2.3 Display Unit DS-600, Remote Controller RD-501/Dimmer Controller RD-502 (option) .....	2-6
2.4 Junction Box DS-640 (option).....	2-8
<b>3. MENU SETTINGS .....</b>	<b>3-1</b>
3.1 How to Use the Service Menu .....	3-1
3.2 How to Set the System Menu .....	3-3
<b>APPENDIX 1 CALIBRATION .....</b>	<b>AP-1</b>
<b>APPENDIX 2 JIS CABLE GUIDE.....</b>	<b>AP-4</b>
<b>PACKING LISTS.....</b>	<b>A-1</b>
<b>OUTLINE DRAWINGS.....</b>	<b>D-1</b>
<b>INTERCONNECTION DIAGRAM .....</b>	<b>S-1</b>



**FURUNO ELECTRIC CO., LTD.**

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# SAFETY INSTRUCTIONS



## WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



## CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Warning, Caution



Prohibitive Action



Mandatory Action



## WARNING



**Have a qualified serviceman do the installation.**

Only qualified personnel should work inside the equipment.



**Turn off the power at the switchboard before installing the equipment.**

Fire or electrical shock can result if the power on.



**Do not install the unit in a place subject to rain or water splash.**

Fire or electrical shock can result.



**Use the specified power cable.**

Fire can result if an incorrect cable is used.



## CAUTION



**Attach protective earth securely to the ship's body.**

The protective earth (grounding) is required for the AC power supply to prevent electrical shock.



**Do not weld the tank with transducer to the ship's hull.**



## CAUTION



**Confirm that the power supply voltage is compatible with the voltage rating of the equipment.**

Connection to the wrong power supply can cause fire or damage to the equipment.



**The mounting location for the display, distributor and transceiver unit must satisfy the following conditions:**

- Away from rain and water splash
- Out of direct sunlight
- Away from air conditioner vents
- Moderate and stable in temperature and humidity



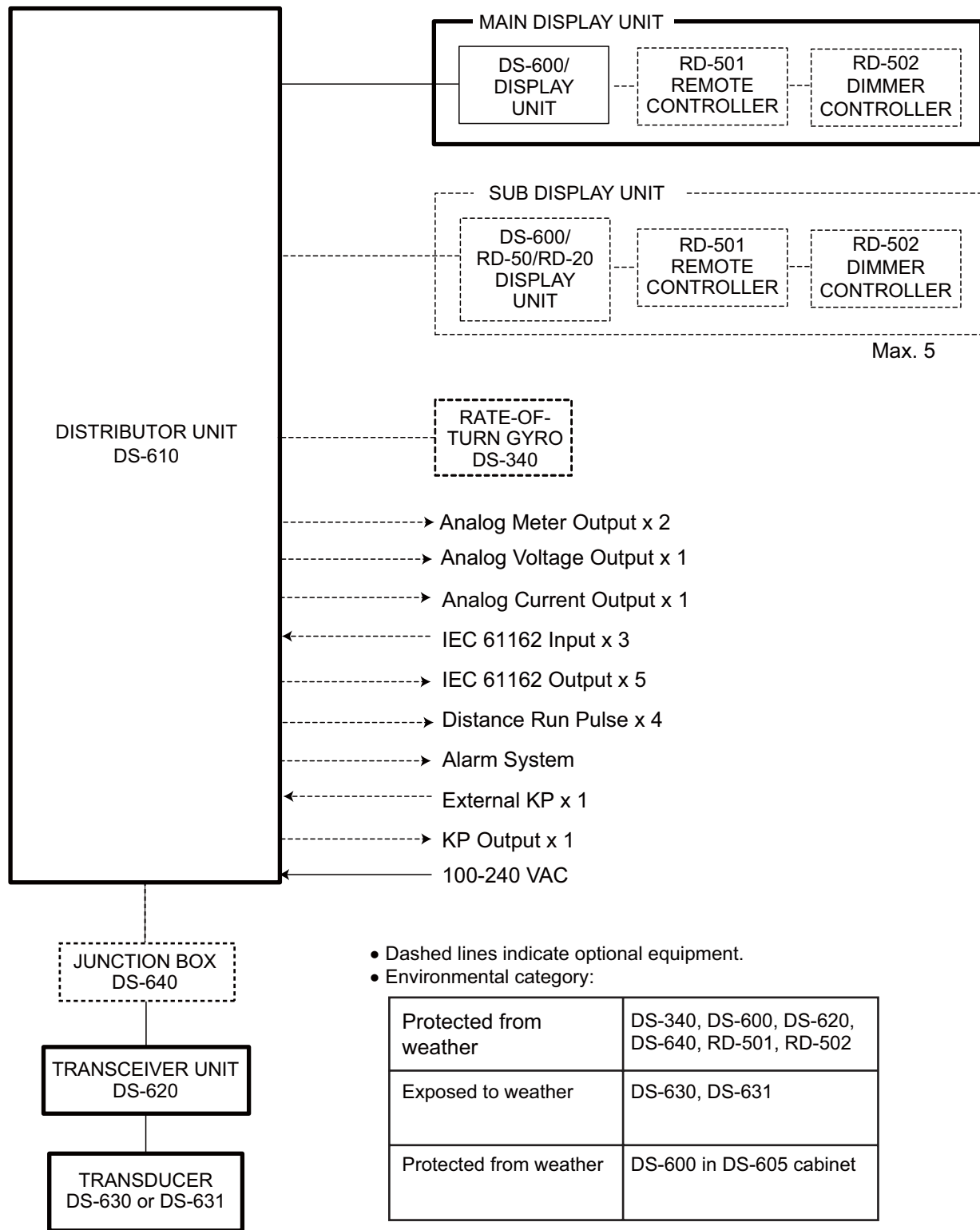
**Use Chugoku Toso brand Marine Star 20 anti-fouling paint or the equivalent for the transducer.**

Coat thinly and evenly. A thick coat can reduce output power.

**Observe the compass safe distances to prevent interference to a magnetic compass.**

	Standard	Steering
DS-600	0.60 m	0.40 m
DS-605	0.95 m	0.60 m
DS-610	3.15 m	2.00 m
DS-620	3.20 m	2.05 m
DS-640	1.15 m	0.70 m
DS-340	1.05 m	0.65 m

# SYSTEM CONFIGURATIONS



# EQUIPMENT LISTS

## Standard supply

Name	Type	Code No.	Qty	Remarks	
Display Unit	DS-600	-	1	8.4” color LCD	
Distributor Unit	DS-610	-	1		
Transceiver Unit	DS-620	-	1		
Transducer	DS-630	-	1	No watertight connector	Select one.
	DS-631	-		w/watertight connector	
Transducer Tank	DS-660	-	1	For DS-630/631	Select one.
Gate Valve	DS-661	-	1	For DS-630 only	
Installation Material	CP26-01501	001-081-900	1 set	For DS-600	
	CP66-01701	001-082-190	1 set	For DS-610	
	CP66-01702	001-082-290	1 set	For DS-620	
	CP66-01703	001-082-630	1 set	For DS-630	
	CP66-01740	000-016-374	1 set	For DS-631 (CP66-01704, 30 m cable)	
	CP66-01750	000-016-375	1 set	For DS-631 (CP66-01704, 40 m cable)	
	CP66-01760	000-016-376	1 set	For DS-631 (CP66-01760, 50 m cable)	
	CP66-01770	000-016-377	1 set	For DS-631 (CP66-01760, 60 m cable)	
	CP66-01710	001-082-830	1 set	For DS-661	when shipped assembled
	CP66-01711	001-082-800		For DS-661	when shipped separated
	CP66-01712	001-082-820	1 set	For DS-661, gasket	
	Spare Parts	SP26-00101	001-076-450	1 set	For DS-600 (other than Deep Sea)
001-077-030			For DS-600 (Deep Sea)		
SP66-00901		001-082-200	1 set	For DS-610 (other than Deep Sea)	
		001-082-210		For DS-610 (Deep Sea)	
SP66-00902		001-082-520	1 set	For DS-620 (other than Deep Sea)	
		001-082-530		For DS-620 (Deep Sea)	
Accessories	FP66-00701	001-082-140	1 set	For DS-600	

**Optional Supply**

Name	Type	Code No.	Qty	Remarks
Rate-of-turn Gyro	DS-340-60	000-027-992	1	100VAC
	DS-340-61	000-028-017		110VAC
	DS-340-62L	000-028-018		115/120VAC
	DS-340-70	000-028-019		200VAC
	DS-340-72	000-028-020		220VAC
	DS-340-74	000-028-021		230/240VAC
Display Unit	DS-600	-	1	8.4" color LCD
Hanger	OP26-8	000-016-313	1	For DS-600
Junction Box	DS-640	-	1	w/Installation materials (CP66-01721)
Water Proof Box	DS-605-R	000-016-398	1	w/Installation materials (CP66-01731), right-hand open door
	DS-605-L	000-016-727		w/Installation materials (CP66-01731), left-hand open door
Flange	OP66-6	000-016-400	1	For DS-600
Tightening Handle	OP66-7	001-082-950	1	
Remote Controller	RD-501	000-016-197	1	
Dimmer Controller	RD-502	000-016-198	1	
Analog Indicator	FL-200S-1	000-015-997-10	1	-10 to 30 kn, flush mount
	FL-200S-2	000-015-998-10	1	-10 to 40 kn, flush mount
	SL-200-1	000-016-000-10	1	-10 to 30 kn, bulkhead mount
	SL-200-2	000-016-164-10	1	-10 to 40 kn, bulkhead mount

# 1. INSTALLATION

## NOTICE

**Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.**

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

## 1.1 Display Unit DS-600

### Mounting consideration

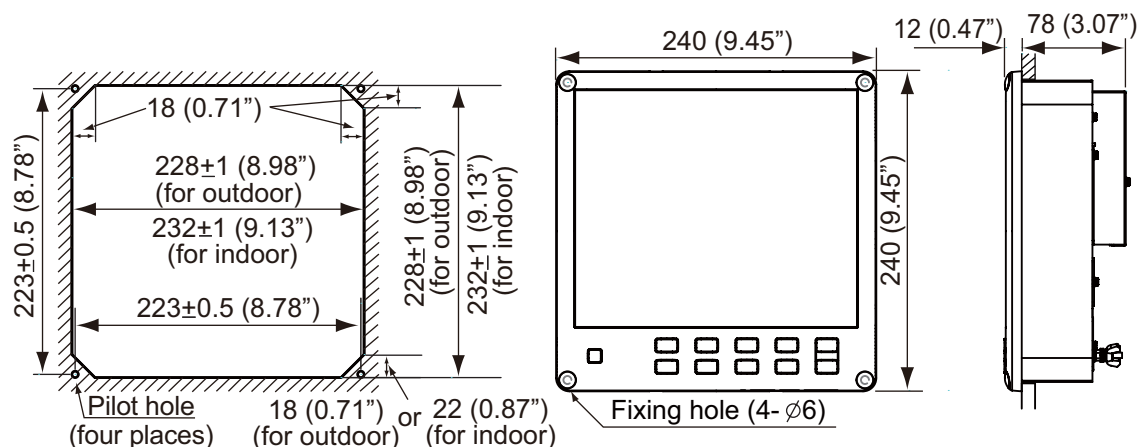
The display unit can be installed on a desktop, on the underside of a table, or flush mounted in a panel. When you select a mounting location, keep in mind the following points:

- Locate the display unit away from exhaust pipes and vents.
- Select an installation location that is well ventilated.
- Locate the display unit where shock and vibration are minimal.
- Allow enough maintenance space at the sides and rear of the display unit and leave enough slack in cables to facilitate maintenance and servicing.
- Observe the compass safe distances (see page i) to prevent the interference to a magnetic compass.
- The nominal viewing distance for the display unit is 1 m. Select a suitable mounting location considering that distance.

### Flush mount

See the outline drawing in the back of this manual. Before you fasten the display unit to the cutout, first connect the cables referring to chapter 2.

1. Make a cutout in the mounting location as shown in the illustration below.



## 1. INSTALLATION

**Note:** Dimensions for the cutout are different depending on the mounting location, indoor or outdoor. For the outdoor mounting, ask dockyard to construct a waterproof case for the display unit.

2. Make four pilot holes for self-tapping screws (diameter: 5 mm) in the location indicated in the illustration on page 1-1.
3. Insert the sponge to the display unit from the rear side.
4. Set the display unit to the cutout and fasten the display unit with four self-tapping screws (5x20).
5. Set a cosmetic cap to each fixing hole on the front panel. See page 1-3.

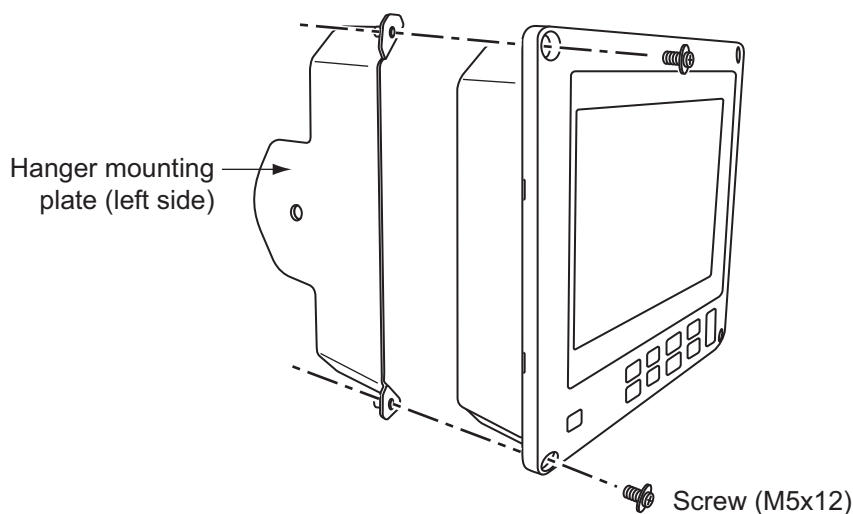
### **Desktop or table underside mount**

The display unit can be mounted on a desktop or on the underside of a table using the optional hanger. See the outline drawing for details.

*Hanger assembly (Type: OP26-8, Code No.: 000-016-313-00)*

Name	Type	Code No.	Qty
Self-tapping screw	5x20	000-171-997-10	4
Binding head screw	M5x12	000-171-999-10	4
Hanger assy.	OP26-8-1	001-081-920-00	1

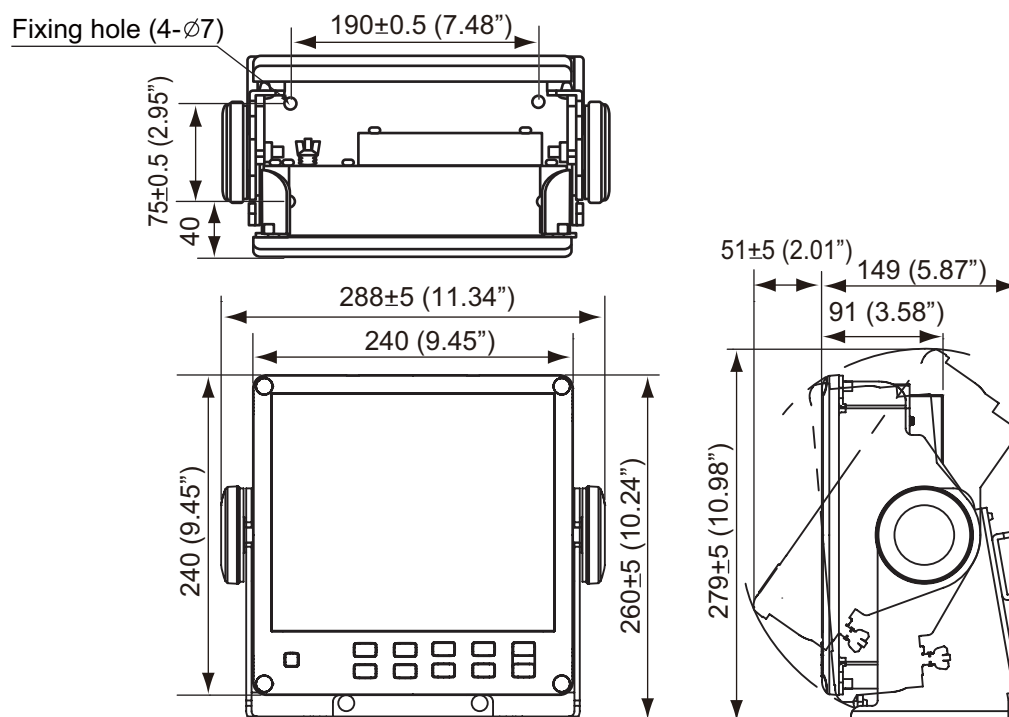
1. Remove the hanger mounting plate from the hanger assembly.
2. Fasten the hanger mounting plate to the display unit from the left side and right side with four binding head screws (M5x12).



3. Make a four pilot holes for self-tapping screws (5x20) in the mounting location.
4. Fix the hanger to the mounting location with four self-tapping screws (5x20).
5. Screw knobs into the display unit loosely.
6. Set the display unit to the hanger.
7. Tighten the knobs to fasten the hanger to the display unit.



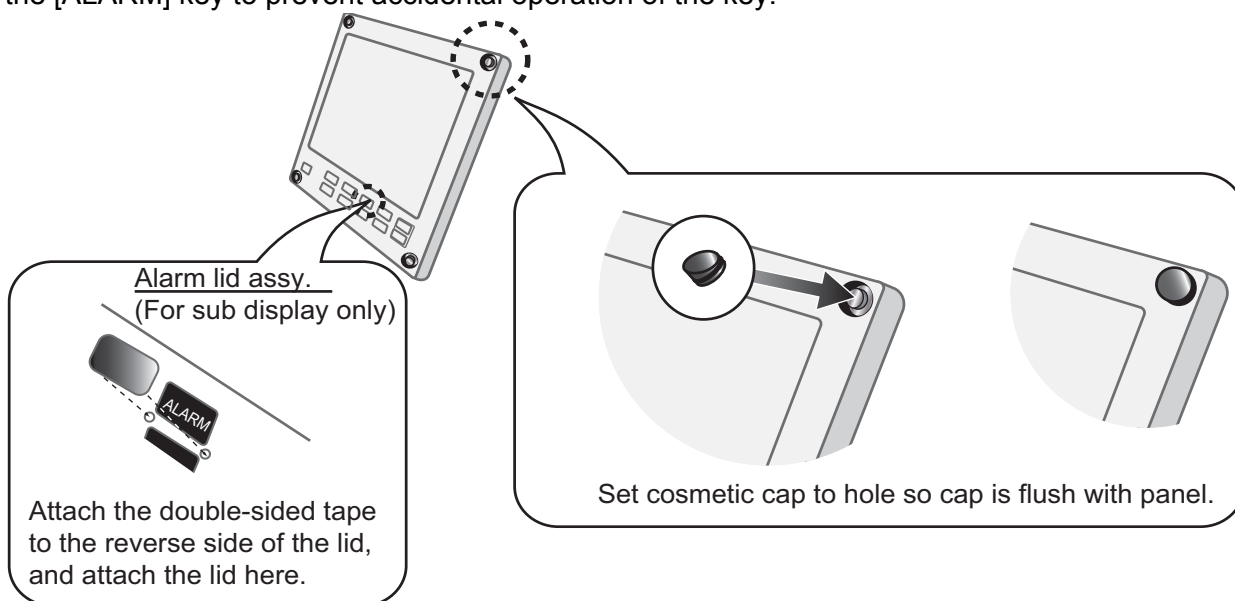
8. Set a cosmetic cap to each fixing hole on the front panel.



### How to set the cosmetic cap and alarm lid assy.

Set a cosmetic cap to each fixing hole on the front panel as shown in the illustration below.

For the display unit to be used as a sub display, attach the alarm lid (supplied as accessories) to the [ALARM] key to prevent accidental operation of the key.



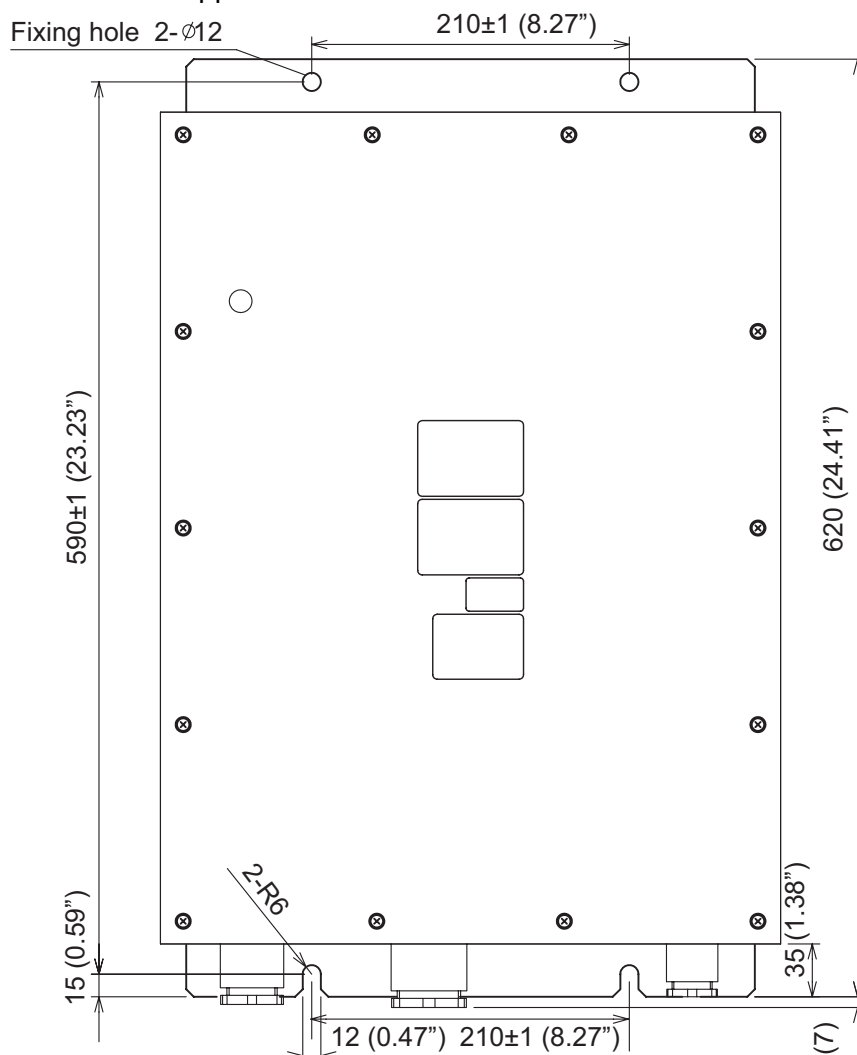
## 1.2 Transceiver Unit DS-620

### Installation considerations

- Since the transceiver unit generates heat, install it in a dry, well-ventilated place. The cooling fans at the top of the unit must not be obstructed, to allow heat to escape.
- This unit is designed for bulkhead mounting to permit dissipation of heat. If bulkhead mounting is absolutely impossible, mount the unit on the floor leaving at least 350 mm clearance between it and the floor to permit dissipation of heat.
- Reinforce the mounting area, if necessary.
- Leave space around the unit for maintenance and checking. Refer to the drawing at the back of this manual for minimum recommended maintenance space.
- A magnetic compass will be affected if the transceiver unit is placed too close to it. Observe the compass safe distances to prevent disturbance to the magnetic compass (page i).

Use four hex. bolts (M10x20) to fix the transceiver unit to the mounting area. See the outline drawing at the back of this manual.

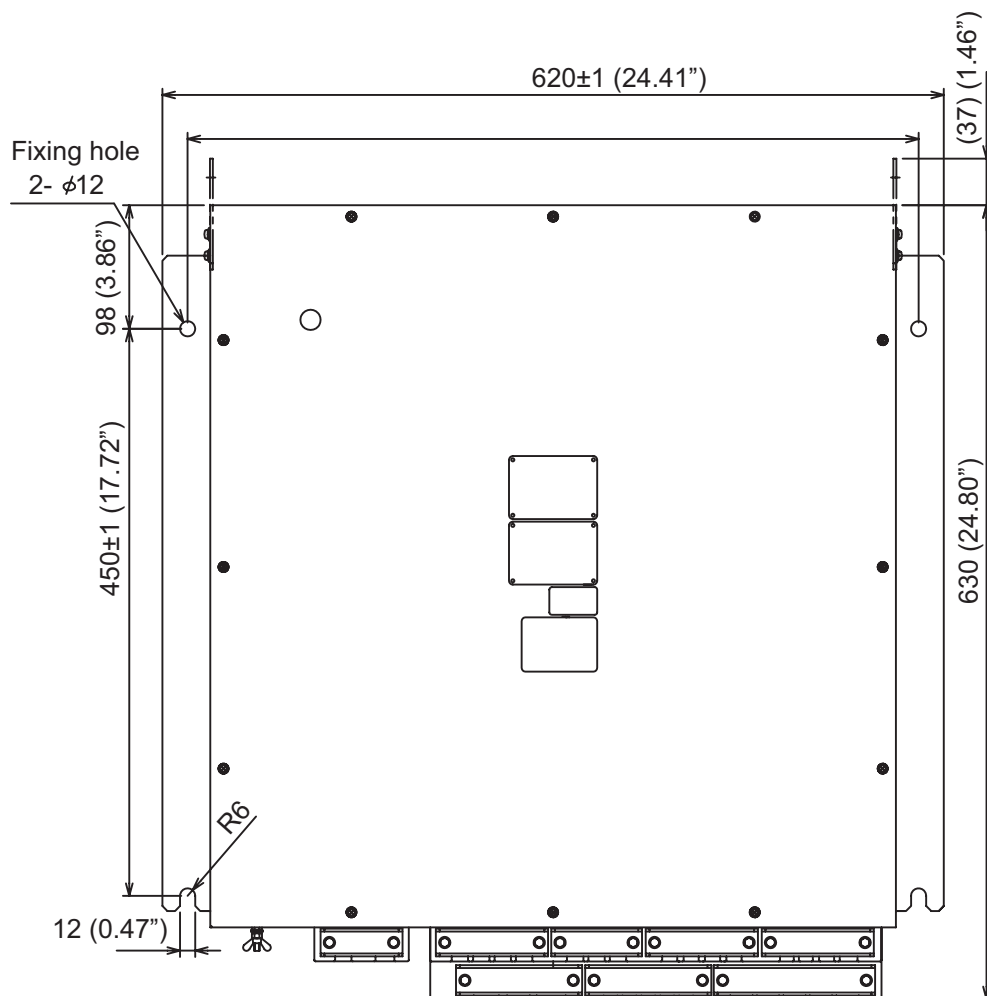
1. Screw in lower hex. bolts so there is 5 mm clearance between bottom of screw head and bulkhead.
2. Hang the unit on the bolts, then tighten the bolts.
3. Fasten the unit with upper hex. bolts.



## 1.3 Distributor Unit DS-610

The distributor unit can be mounted on the deck or on a bulkhead. Consider the following points when selecting a mounting location.

- Select a location which is both well ventilated and low in humidity to keep the unit cool.
  - For bulkhead mounting, be sure the mounting location is strong enough to support the weight under the continued vibration normally encountered on the vessel.
  - A magnetic compass will be affected if the distribution box is too close. Observe the compass safe distances to prevent disturbance to the magnetic compass.
1. Screw in lower hex. bolts so there is 5 mm clearance between bottom of screw head and bulk-head.
  2. Hang the unit on the bolts, then tighten the bolts.
  3. Fasten the unit with upper hex. bolts.



## 1.4 Transducer

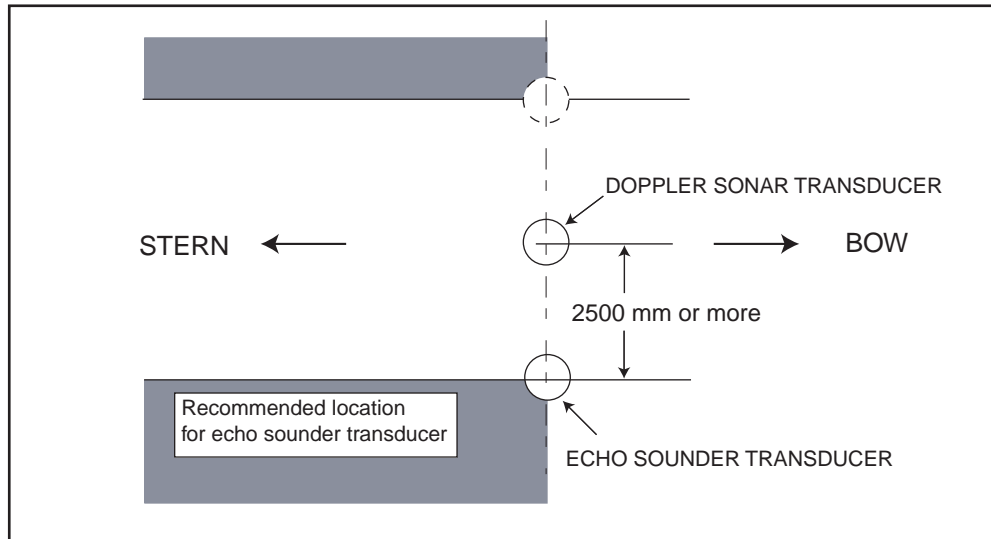
The performance of this equipment is directly dependent on the installation of the transducer.

The installation of the transducer and the tank must be accomplished by a dockyard referring to the installation drawings at the later part of this manual.

### 1.4.1 Installation location

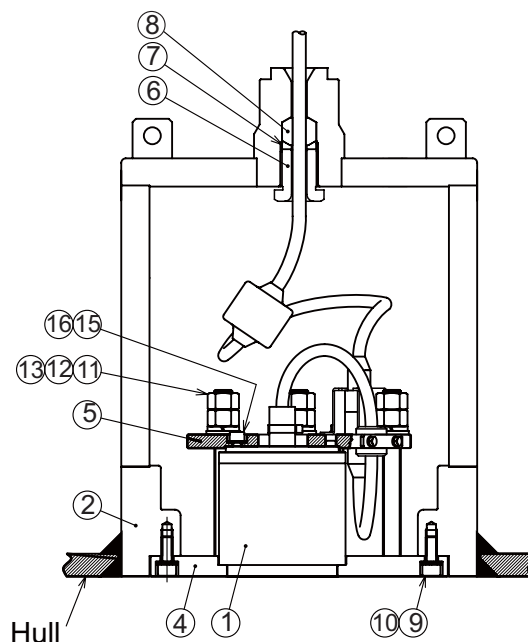
To decide the location of the transducer, the following points must be taken into account.

- Locate the transducer of DS-60 at least 2.5 m from the transducer of an echo sounder.



- Separate as far as possible from air bubble sources; e.g., side thruster and water disposal pipes.
- Install in close proximity to the keel, for uniform water flow.
- Generally, best performance is obtained by mounting on the bow; the stern side is influenced more easily by air bubbles and propeller cavitation.
- Do not apply any paint to the transducer face.

### 1.4.2 Installation using the transducer tank DS-660

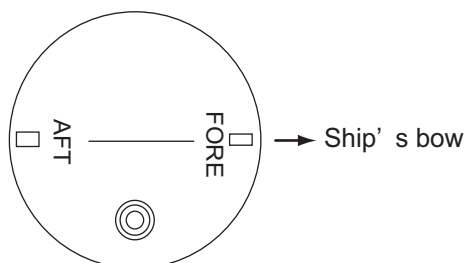


*Transducer tank DS-660, sectional view*

1. Remove flange (4), fixing plate (5), fixing gland (6), washer (7) and gasket (8) from the tank.
2. Set the tank to the place which was selected at paragraph 1.4.1.

The "FORE-AFT" line on the tank must be parallel with the line between ship's fore and aft (error: within 3°).

For horizontal direction, the bottom of the tank (2) must be parallel with the draft.

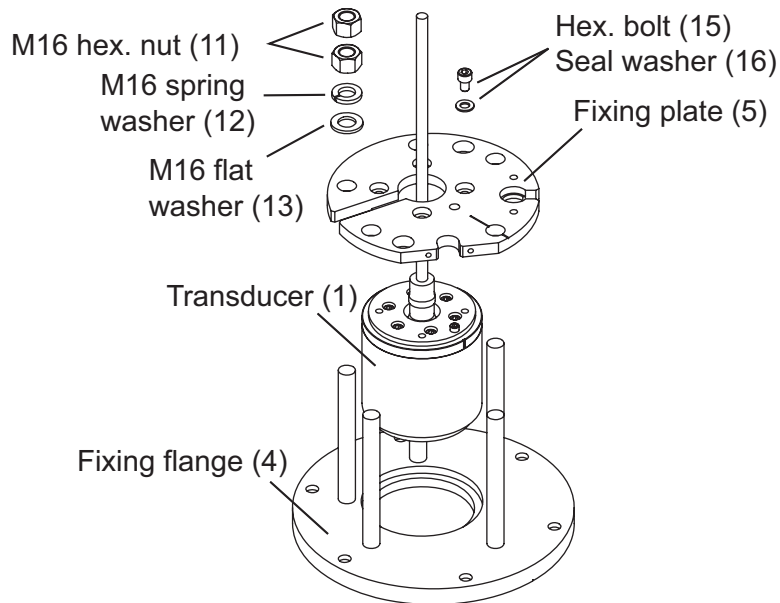


*DS-660 Tank, top view*

3. Weld the tank (2) to the ship's hull. The doubling and welding methods are left up to the shipyard.
4. Paint the tank (2), flange (4) and fixing plate (5) the same color as the ship's body. Paint only gray-colored areas; for other part, seal with a masking tape.
5. Apply liquid gasket (supplied) to the top of the transducer evenly.
6. Mount the fixing plate (5) on the transducer (1).
7. Attach seal washer (16) to hex. bolt M8x12 (15).
8. Use hex. bolt (15)(16) assembled at step 7 to fasten the transducer (1) and fixing plate (5).

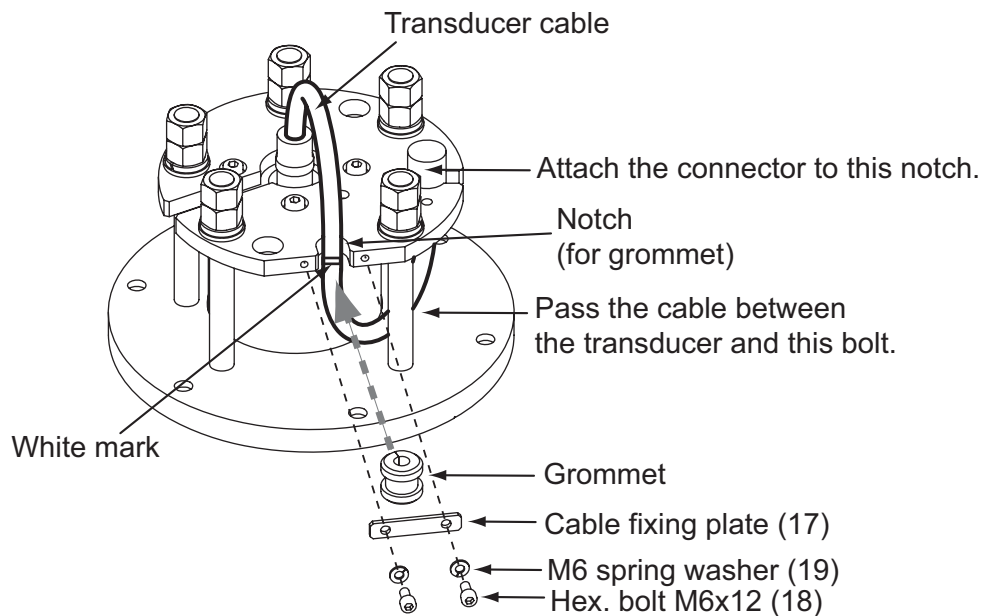
## 1. INSTALLATION

9. Use M16 nut (11), spring washer (12) and flat washer (13) to fix the transducer (1) w/fixing plate to the fixing flange (4).



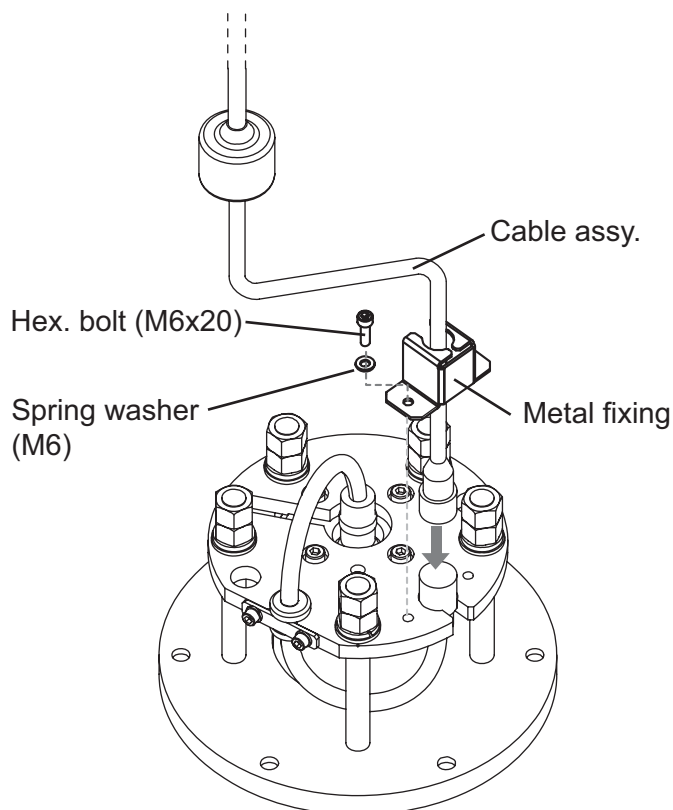
10. For the transducer DS-631, do the following steps:

- 1) Attach the grommet (supplied) to the location marked with a white line on the transducer cable.
- 2) Fix the grommet attached at step 1) to the notch shown below, by using the cable fixing plate (17), hex. bolt M6x12 (18), spring washer M6 (19).
- 3) Pass the connector at the end of the transducer cable between the transducer and M16 bolt, and attach the notch as shown below.



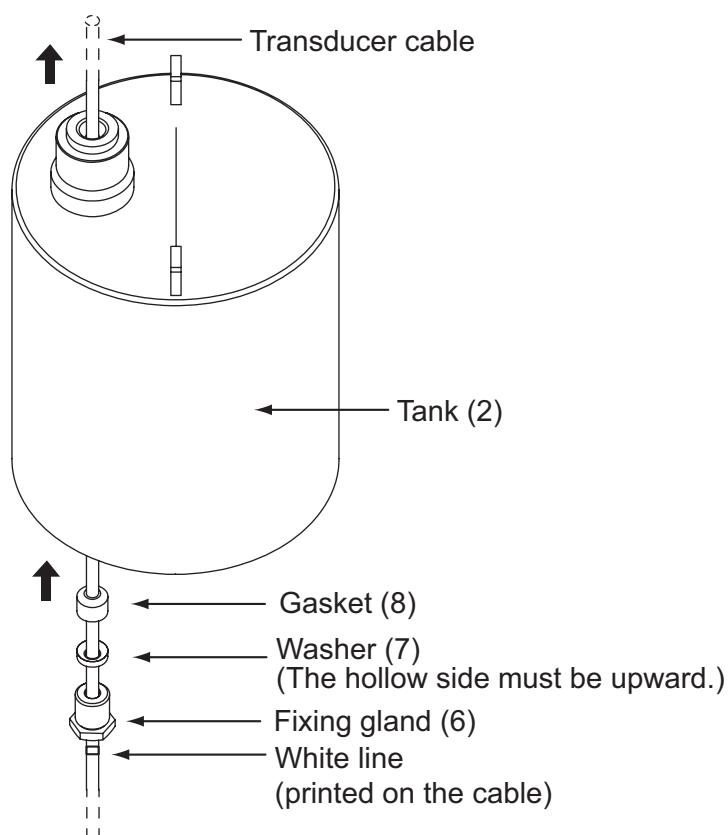
- 4) Connect the cable assy. (supplied) to the connector attached at step 3).  
Clean the connector faces and pins before the connection.

- 5) Attach the metal fixing (supplied) to the connector, and use two bolts M6x20 and spring washers M6 to fix them.



11. Pass the fixing gland (6), washer (7) and gasket (8) through the transducer cable (DS-631: cable assy), and slide them to the white line on the cable.

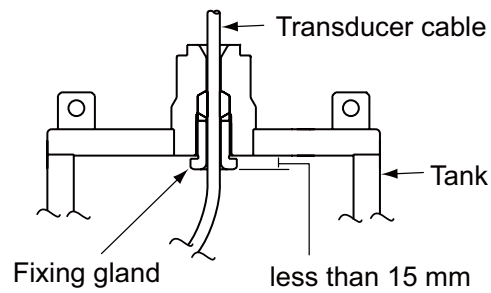
12. Pass the cable through the hole at the top of the tank (2).



## 1. INSTALLATION

13. Use the tightening handle (option) to fasten the fixing gland (6) from the inside of the tank (2).

The distance between the bottom of the fixing gland (6) and tank must be less than 15 mm.

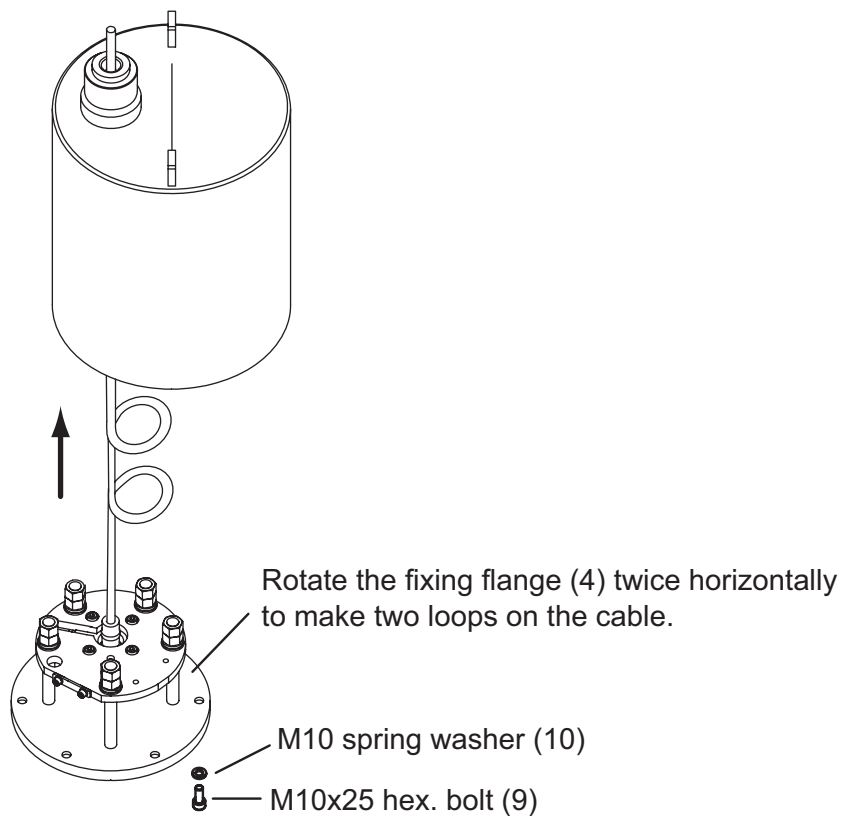


*Transducer tank, sectional view*

14. Rotate the fixing flange (4) twice horizontally to make two loops.

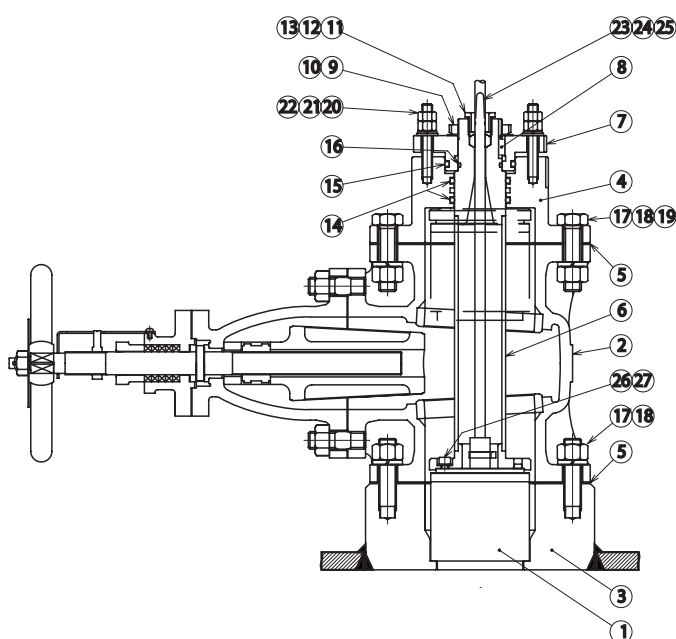
These loops make it easy to put the cable in the tank.

15. Use the bolt M10x25 (9) and spring washer M10 (10) to fasten the fixing flange (4) to the tank (2).





### 1.4.3 Installation with gate valve DS-661

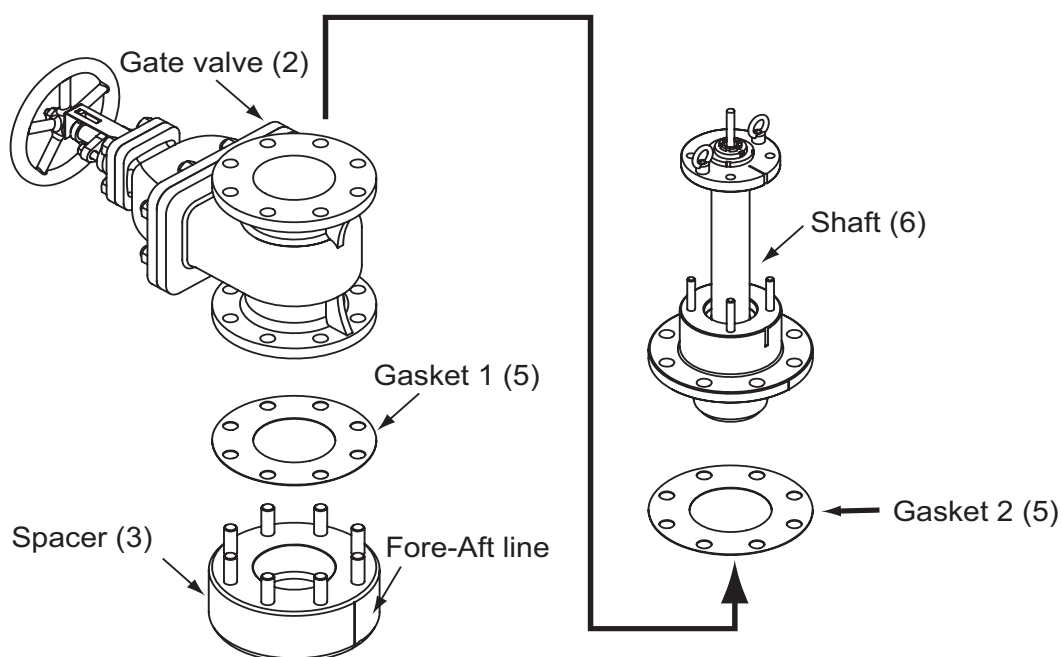


*DS-661 gate valve, sectional view*

**Note:** To install the gate valve, service space of 1000 mm height is necessary. For details, see the installation drawing at the back of this manual.

1. When your unit is shipped assembled, remove the five items shown below:

- Gate valve (2)
- Spacer (3)
- Gasket (5), 2 pcs.
- Shaft (6)

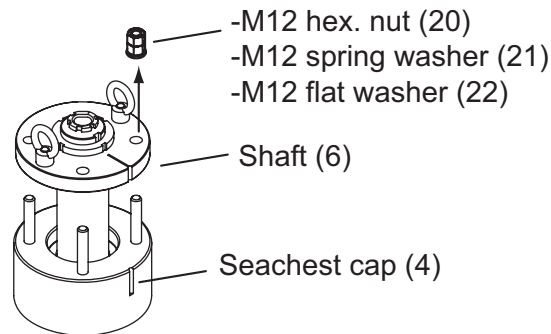


## 1. INSTALLATION

2. Set the spacer (3) to the place selected at paragraph 1.4.1.

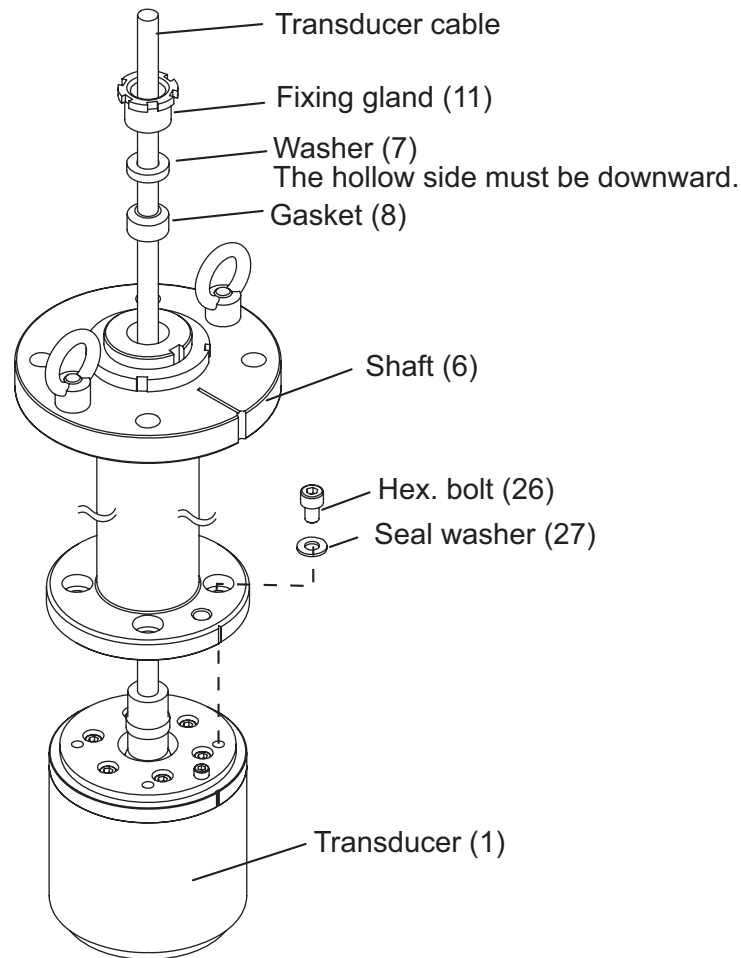
The "FORE-AFT" line on the spacer must be parallel with the ship's fore and aft line (within 3°). For horizontal direction, the bottom of the spacer must be parallel with the ship's draft.

3. Weld the spacer (3) to the ship's hull. The welding and doubling methods are left up to the shipyard.
4. Unfasten M12 hex. nut (20), spring washer (21) and flat washer (22) to remove the shaft (6) from the seachest cap (4).



5. Paint the gate valve (2), spacer (3) and seachest cap (4) the same color as ship's body. Paint only gray-colored areas; for other part, seal with a masking tape.
6. Pass the cable from the transducer (1) through the shaft (6) from the bottom.
7. Apply liquid gasket (supplied) on the top of the transducer (1).
8. Use hex. bolt (26) and seal washer (27) to fasten the transducer (1) to the shaft (6).

9. Pass the gasket (8), flat washer (7) and fixing gland (11) through the transducer cable.



10. Fasten the fixing gland (11) to the top of the shaft (6).

The height between the top of the fixing gland (11) and the top of the shaft (6) must be less than 7 mm.

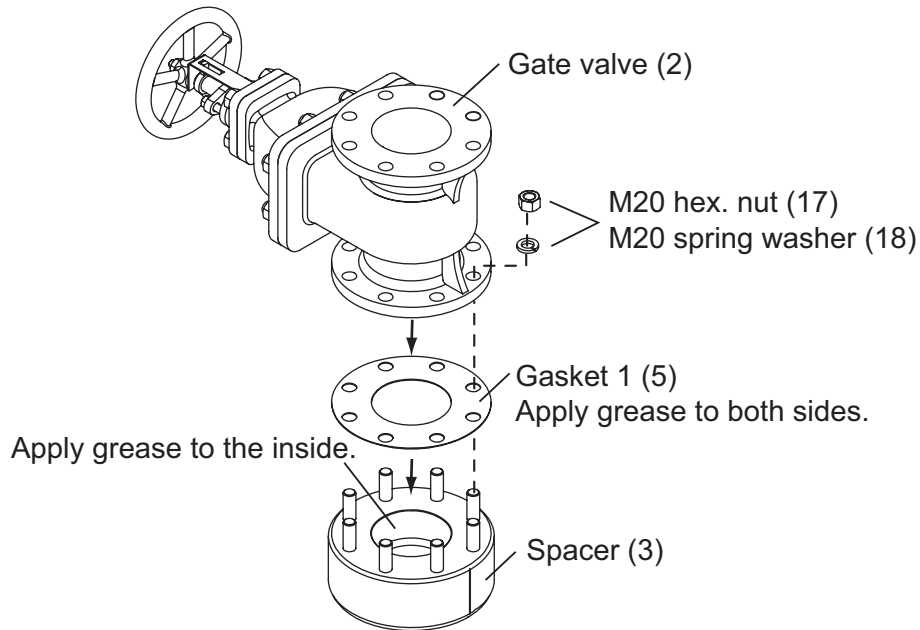
11. Apply grease (supplied) to both sides of the gasket 1 (5), and set it on the spacer (3).

12. Apply grease (supplied) to the inside of the spacer (3).

13. Clean the top and bottom of the gate valve (2), and mount it on the gasket 1 (5) mounted on the spacer (3) at step 11.

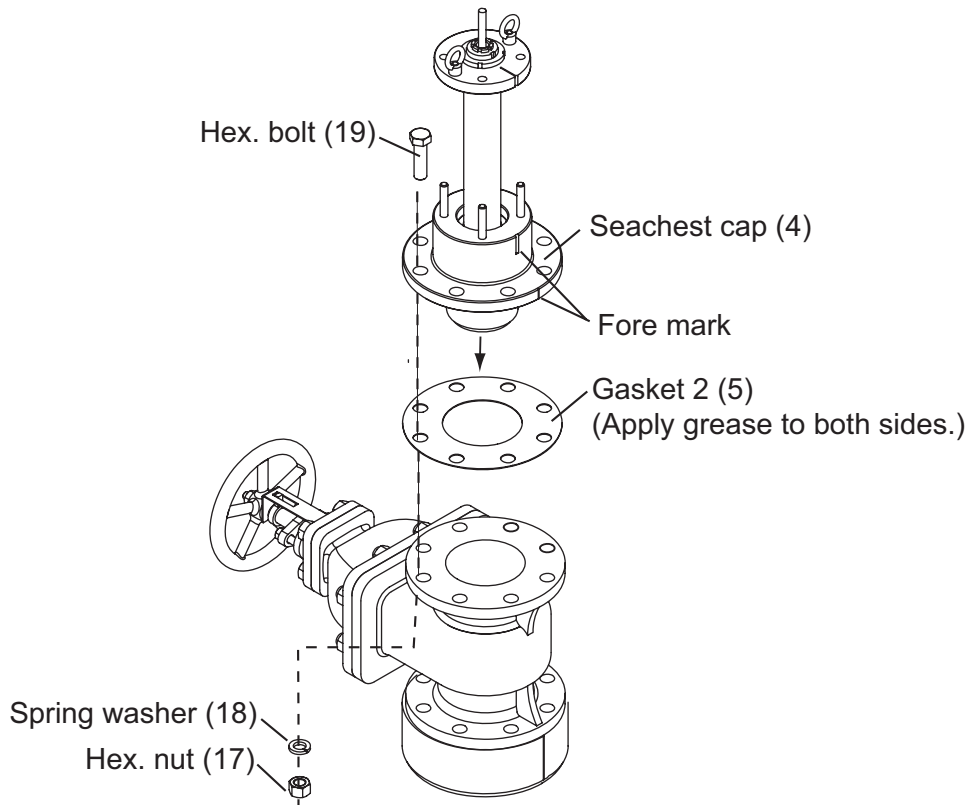
## 1. INSTALLATION

14. Fasten M20 hex. nut (17) and spring washer (18) loosely to the stud bolt of the spacer (3).



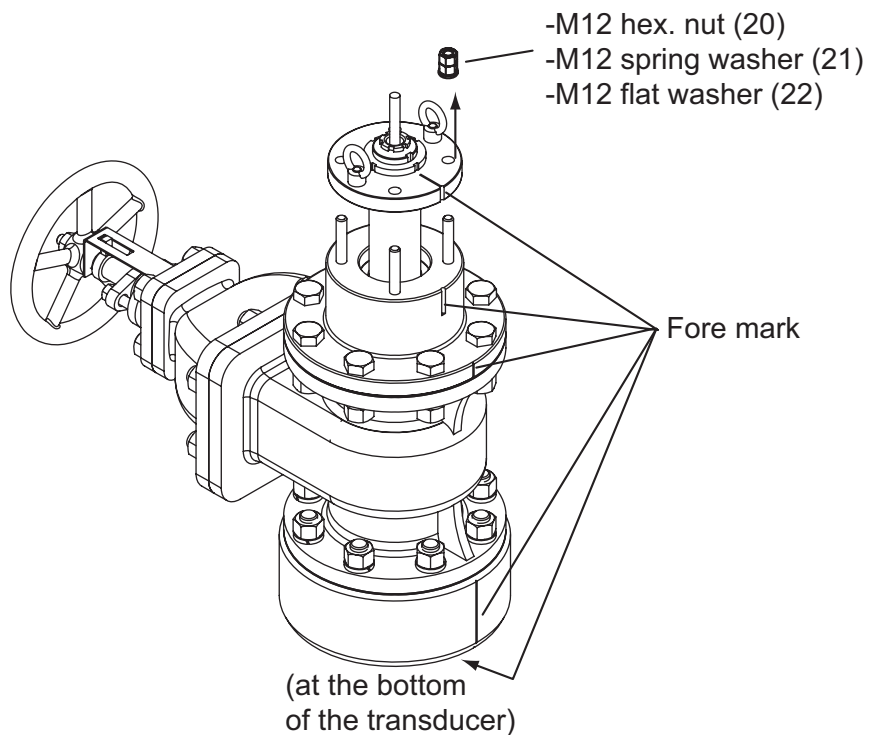
15. Apply grease (supplied) to both sides of the gasket 2 (5), and set it on the gate valve (2).

16. Use hex. nut (17), spring washer (18) and hex. bolt (19) to mount the seachest cap (4) of the shaft (6) on the gate valve (2).

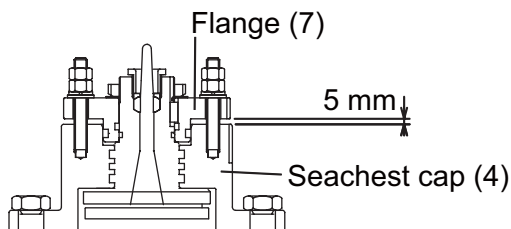


17. Move the shaft (6) upward and downward by hands to check if it moves smoothly.

18. Check that fore marks are aligned, and fasten hex. nut (17), spring washer (18) and hex. bolt (19) tightly.
19. Fasten hex. nut (20), spring washer (21) and flat washers (22) removed at step 4 to stud bolt on the seachest cap.

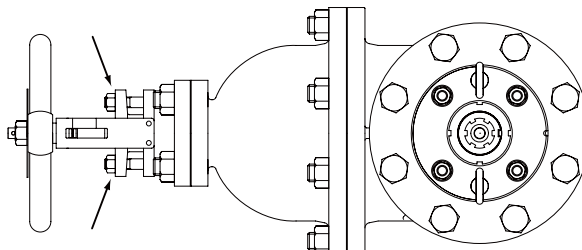


The distance between the seachest cap (4) and flange (7) must be 5 mm.



### **How to open the gate valve**

When you open or close the gate valve, unfasten two nuts shown below to rotate the handle. Then, fasten nuts to fix the handle.



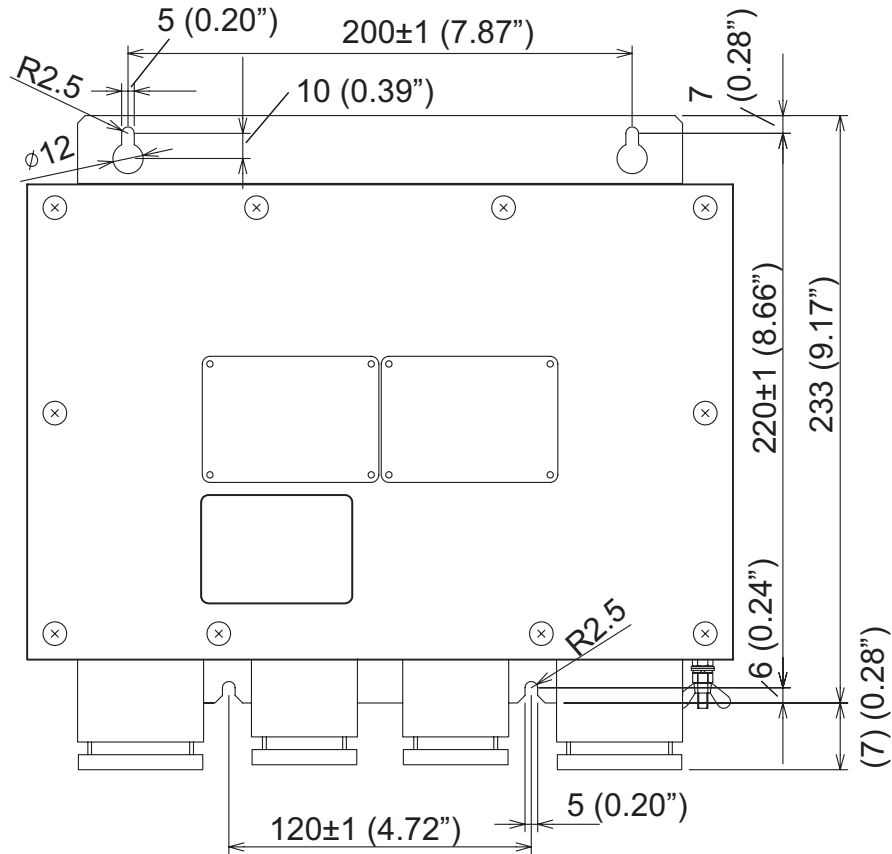
## 1.5 Junction Box DS-640 (option)

### Installation considerations

The junction box forms a joint between the distributor and the transceiver unit, and extends the distance between them to max. 500 m. Install it as below:

- Keep the junction box away from noise-emitting electrical machinery, for example, electric generator, radio transmitter and TV.
- Do not install the junction box in place of high temperature and humidity.

See the outline drawing at the back of this manual.



## 1.6 Installation of Display Unit with DS-605 (Water Proof Box, option)

For installation of the display unit on the wings of the bridge, use the optional water proof box DS-605. Fix the DS-605 on the bulkhead and set the display unit therein.

*Installation materials for DS-605 (Type: CP66-01731, Code No.: 001-082-660-00)*

Name	Type	Code No.	Qty	Remarks
Seal Washer	03-001-3002-0 RoHS	300-130-020-10	4	
Gasket (2)	26-003-1605	100-355-310-10	1	For DS-60
Washer (2)	26-003-1607	100-355-320-10	2	
Cable Gland Washer	JIS F8801 25C	000-172-238-10	2	For RD-50
Cable Grand Inner gasket	JIS F8801 25C	000-171-892-10	1	
Silicon Rubber	S-8400W 50G	000-158-483-10	1	

### Mounting considerations

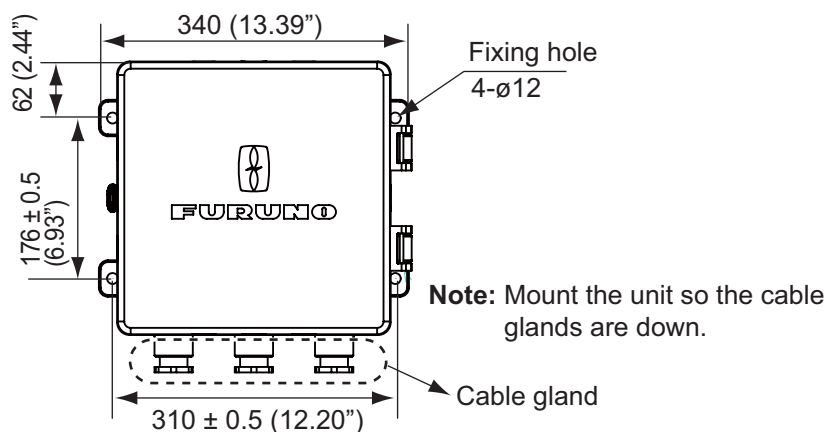
The DS-605 has waterproofing protection of IP56. When you select a mounting location for the waterproof box, keep in mind the following points.

- Keep the unit away from electromagnetic field-generating equipment like motors and generators.
- For maintenance and checking purposes, leave enough space at the sides of the unit and leave slack in cables. See the outline drawing at the back of this manual.
- A magnetic compass will be affected if the waterproof box is too close to the magnetic compass. Observe the compass safe distances (see page i) to prevent interference to a magnetic compass.

### Mounting procedure

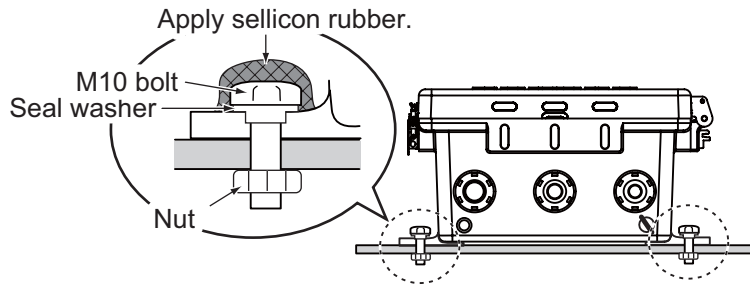
**Note:** Mount the DS-605 on the bulkhead so the cable glands and the drain hole are down.

1. Fix the DS-605 on the wings of the bridge.
  - 1) Insert the seal washer to four fixing holes.
  - 2) Fix the DS-605 with four M10 bolts (dockyard supply).



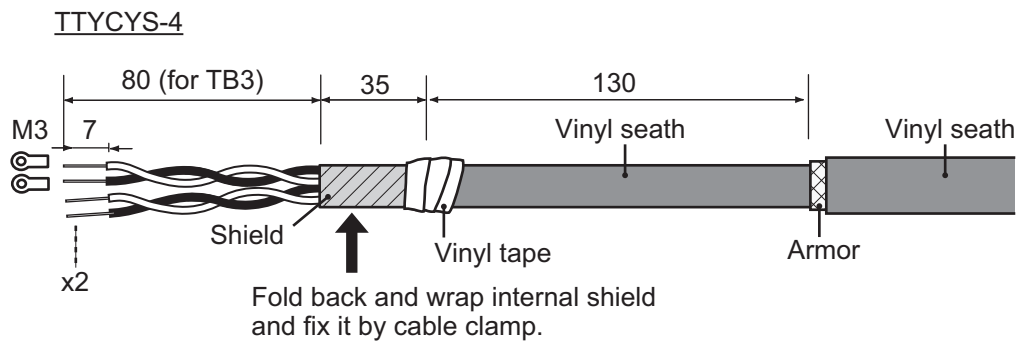
## 1. INSTALLATION

- 3) Apply silicon rubber to M10 bolts as shown below.



2. Connect the TTYCS-4 cable to the DS-600 through the cable glands for the DS-605.

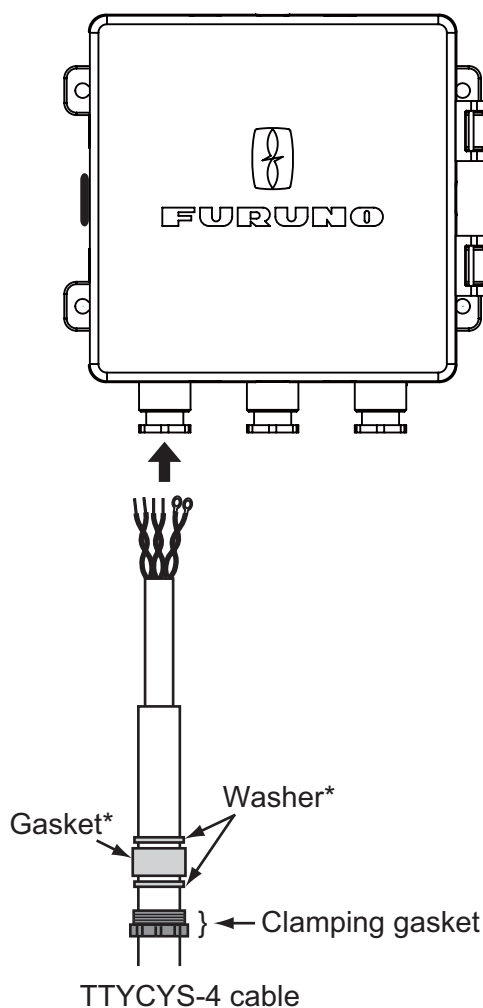
- 1) Fabricate the cable as shown below.



- 2) Pass the clamping gland, washer (26-003-1607), gasket (26-003-1605) and washer (supplied as installation materials) onto the cable, in that order.



3) Pass the cable through the cable gland as shown below.



\*: Attached inside the cable gland

- 4) Put the flush mounting sponge to the flange from the rear side of the DS-600.
- 5) Open the front cover of the DS-605 and connect the ground wire attached inside the DS-605 to the ground terminal on the rear of the DS-600.
- 6) Connect the cables to the DS-600. Refer to chapter 2.
3. Remove each binding head screw from four corners of the DS-605 and set the D-600 to the DS-605.
4. Apply silicon grease to the binding head screws and fix the DS-600 to the DS-605 with four binding head screws.
5. Tighten the clamping glands to fix the cables.
6. Apply the putty to the cable glands for waterproofing.
7. Connect the ground terminal for the DS-605 to the ground terminal on the hull with the IV-1.25 sq. wire.

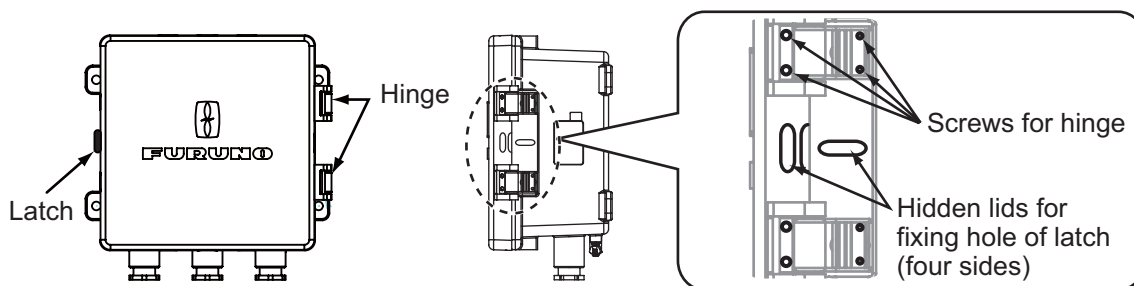
## 1. INSTALLATION

### **How to change orientation of the front cover of DS-605**

The front cover of the DS-605 can be oriented up, down, right or left. To change the orientation of the front cover, do the following.

**Note:** Set the front cover so the FURUNO logo on the cover is right side up. The drain hole must be down.

1. Remove eight screws from two hinges.
2. Remove two screws from the latch.
3. Remove the hinges and the hidden lids for fixing hole of latch in consideration of the opening direction. The hidden lids for fixing hole of latch are taped on each side.
4. Orient the front cover as desired and fix the hinges and latch.

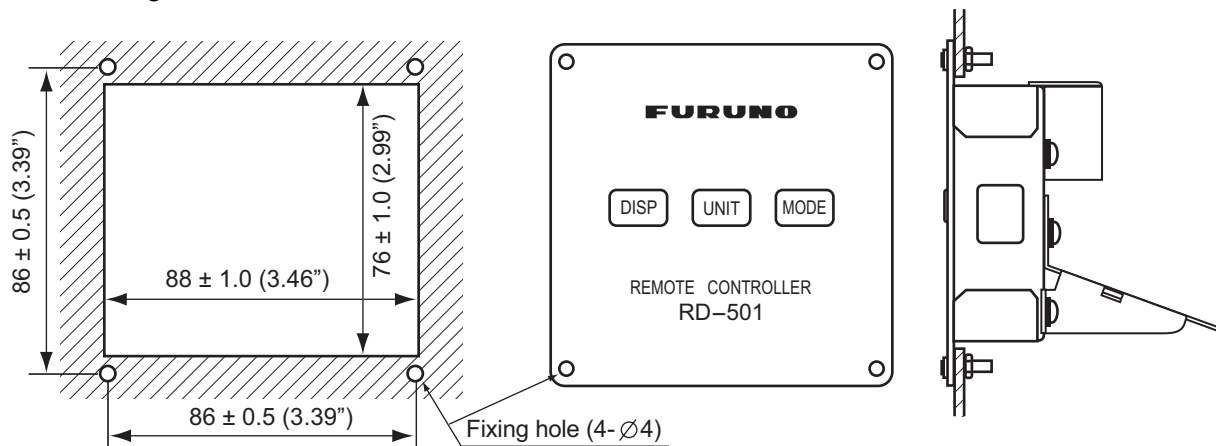


## **1.7 Remote Controller RD-501/Dimmer Controller RD-502 (option)**

The optional remote controller RD-501 and dimmer controller RD-502 can be flush mounted in a panel. The size and the mounting procedure are shared by RD-501 and RD-502. For the mounting location, refer to the mounting considerations for the display unit in section 1.2.

**Note:** Before you fasten the display unit to the cutout, first connect the cables referring to chapter 2.

1. Make a cutout in the mounting location (88 mm (width) x 76 mm (height)).
2. Make four holes of 4 mm diameter in the locations indicated in the illustration below.
3. Set the remote controller or dimmer controller to the cutout. Insert four binding head screws (M3x12) from the front side then fasten the unit with four sets of flat washers, spring washers and hexagonal nuts from the rear side.



## 1.8 Rate-of-Turn Gyro DS-340 (option)

The rate-of-turn gyro must be installed, in a location with minimal vibration, so that the sensor inside the unit is level to within 1 degree. (There is no designation for orientation of the unit.) Select the location considering that the cable for connection with the distributor is 5 m.

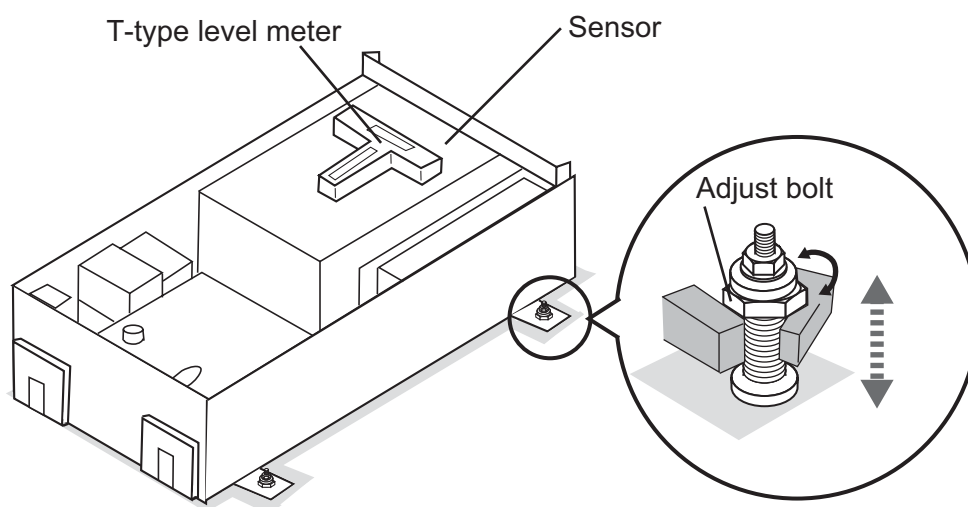
Use the four stud bolts, flat washers, spring washers and eight adjust nuts to fix the unit. See the outline drawing at the back of this manual.

Use the XH connector (supplied with DS-340) to connect cables.

### **Leveling adjustment**

This adjustment must be performed while the ship is in dry-dock where it has no heeling and trimming inclinations.

Place a T-type level meter on top of the sensor to measure longitudinal and transverse inclination. To level the sensor, turn the adjust bolts.

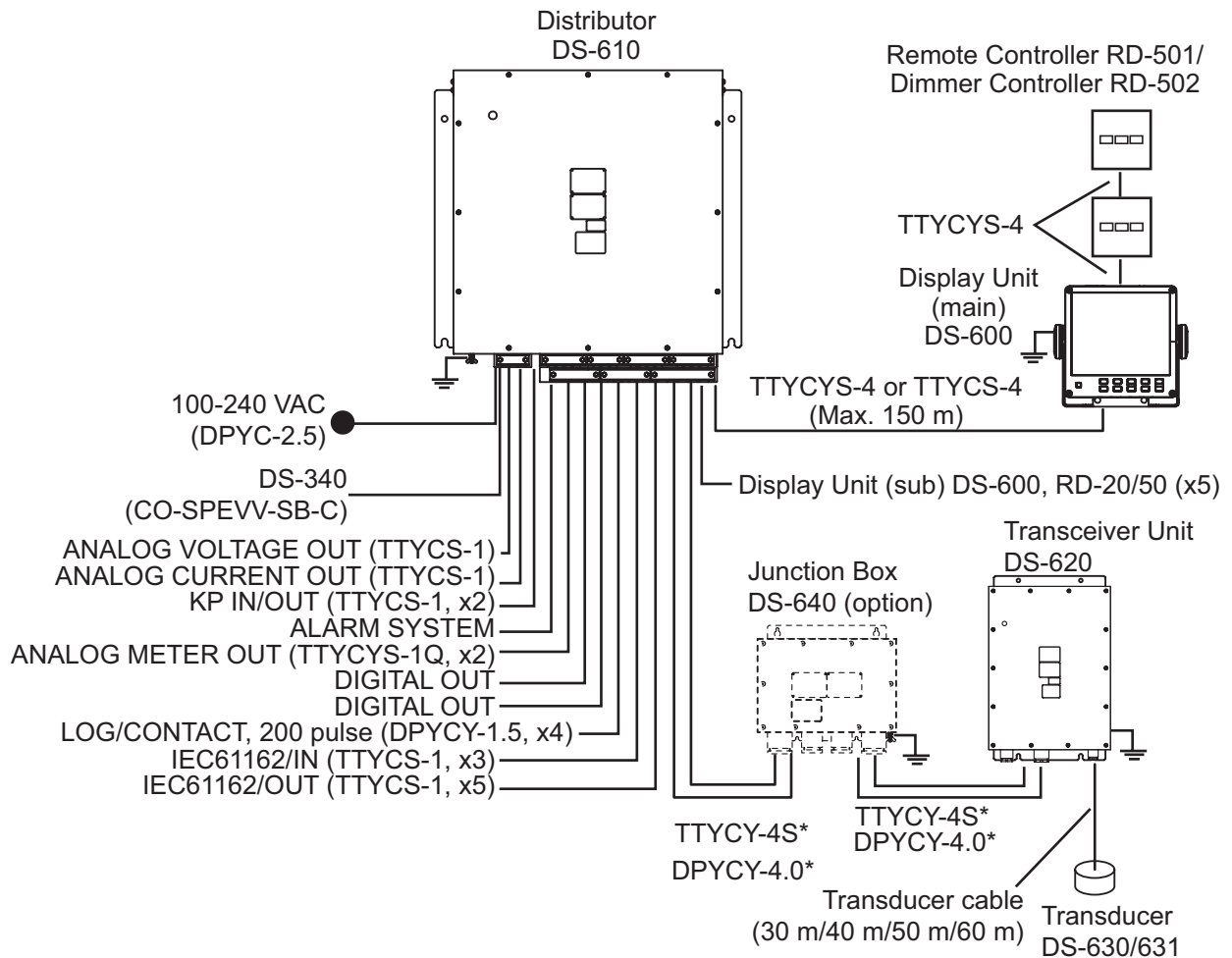


## 1. INSTALLATION

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## 2. WIRING

Refer to the interconnection diagram at the back of this manual to connect cables.



\*The cable length between DS-620 and DS-610 must be less than 500 m.

Note: For details of JIS (Japan Industrial Standard) cables, see APPENDIX 2.

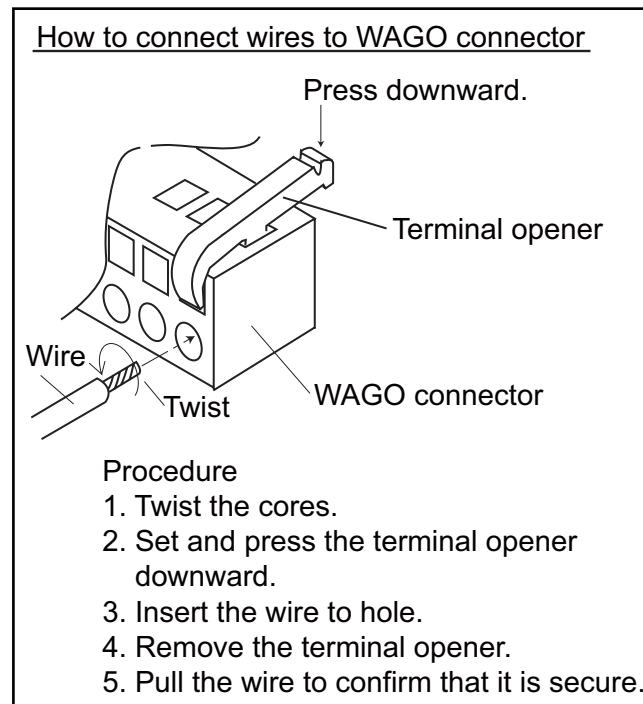
### Precautions for cable installation

Observe the following guidelines to prevent noise, interference problem.

- The transducer cable carries very weak signals (amplitude less than  $0.1 \mu\text{V}$ ), which are easily interfered by noise. The need for a good ground cannot be overemphasized.
- Locate DS-60 cables away from the transmission antenna cable or radio equipment.
- Locate the DS-60 cables away from the power cables mentioned below. Also, separate cables at least 400 mm when the cables are run parallel with power cables.
  - Cable carrying more than a few kilowatts power to fluctuating loads
  - Cable carrying switching waves generated by thyristor, etc.

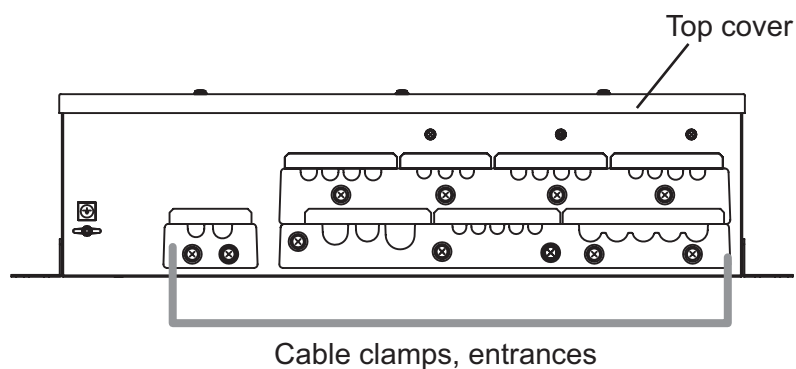
### **Connection of WAGO connector**

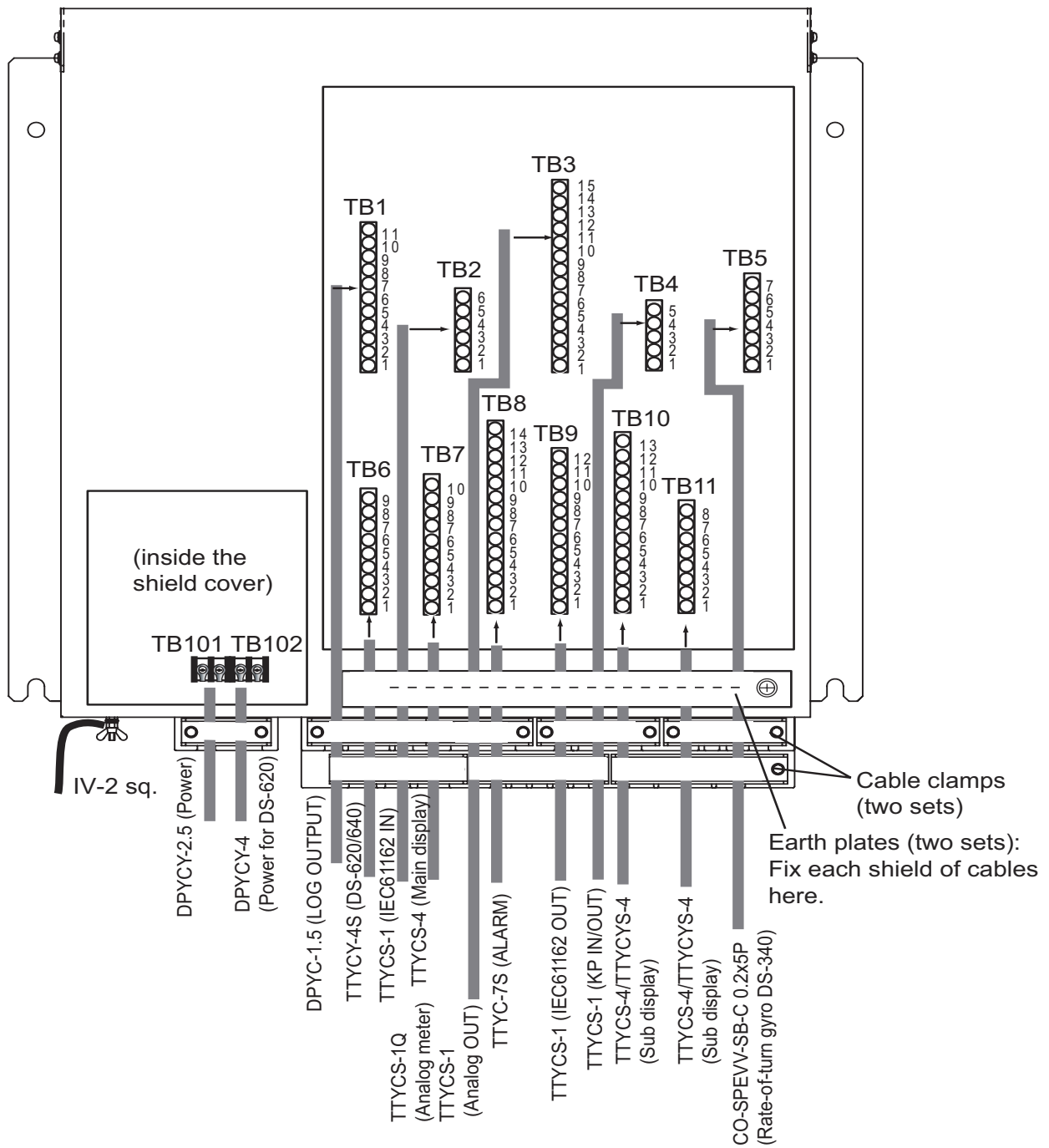
Remove the WAGO connector from each unit and connect each cable core to the WAGO connector. See the interconnection diagram at the back of this manual. The terminal opener is attached inside each unit.



## **2.1 Distributor Unit DS-610**

The Distributor Unit DS-610 has two lines of cable clamps, and there are 13 cable entrances in total. The cables and corresponding cable entrances are shown on the reverse side of the top cover of the DS-610. Fabricate cables referring to page 2-4. Pass the cables through their respective cable entrances and connect them to WAGO connectors.

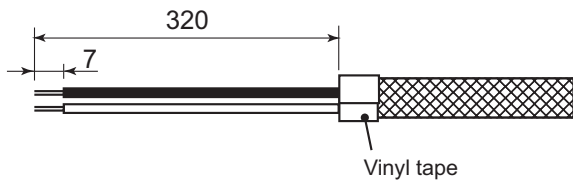




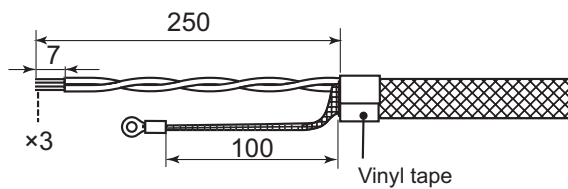
## 2. WIRING

### DS-610 Distributor Unit

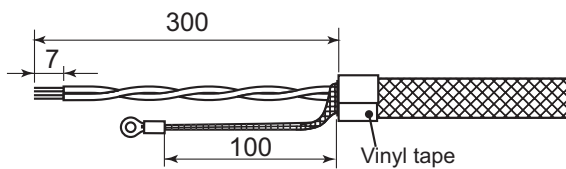
TB1 (LOG OUT), DPYC-1.5



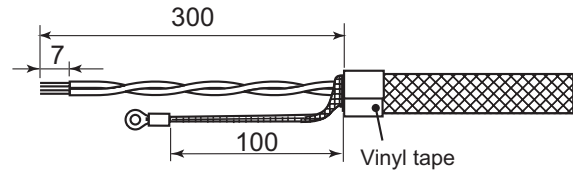
TB2 (IEC61162 IN), TTYCS-1



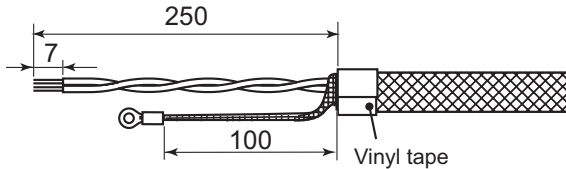
TB3 (Analog meter), TTYCS-1Q



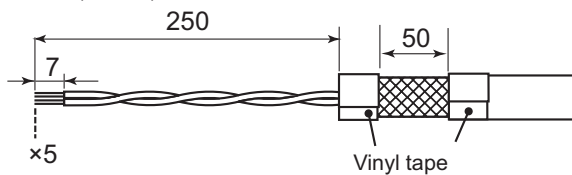
TB3 (Analog current/voltage), TTYCS-1



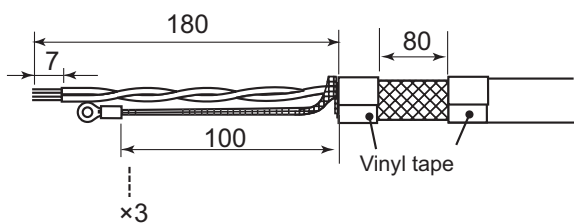
TB4 (KP IN/OUT), TTYCS-1



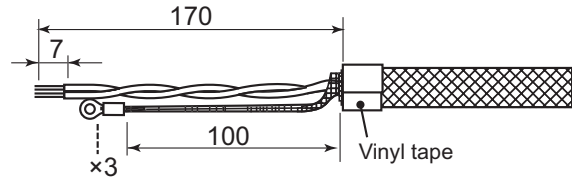
TB5 (DS340), CO-SPEVV-SB-C 0.2x5P



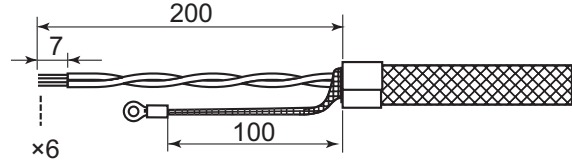
TB6 (DS620/640), TTYCY-4S



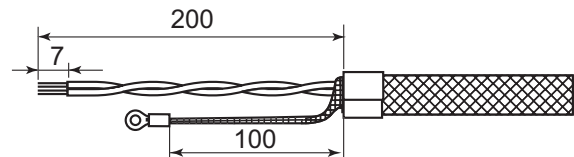
TB7 (DS600), TTYCS-4



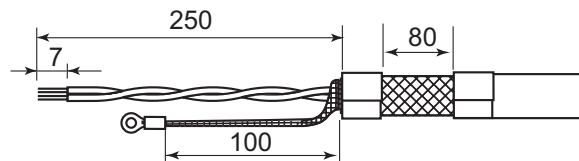
TB8 (ALARM), TTYC-7S



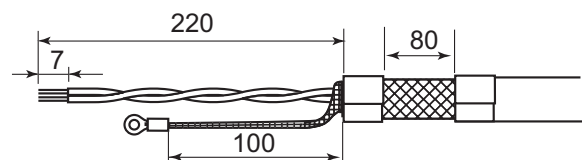
TB9 (IEC61162 OUT), TTYCS-1



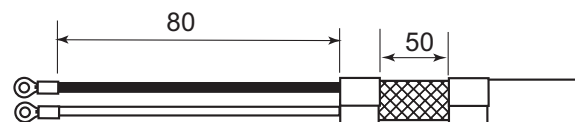
TB10 (Sub display), TTYCS-4/TTYCYS-4 (for DS-605)



TB11 (Sub display), TTYCS-4/TTYCYS-4 (for DS-605)



TB101 Power (main), DPYCY-2.5



TB102 Power (for DS-620), DPYCY-4

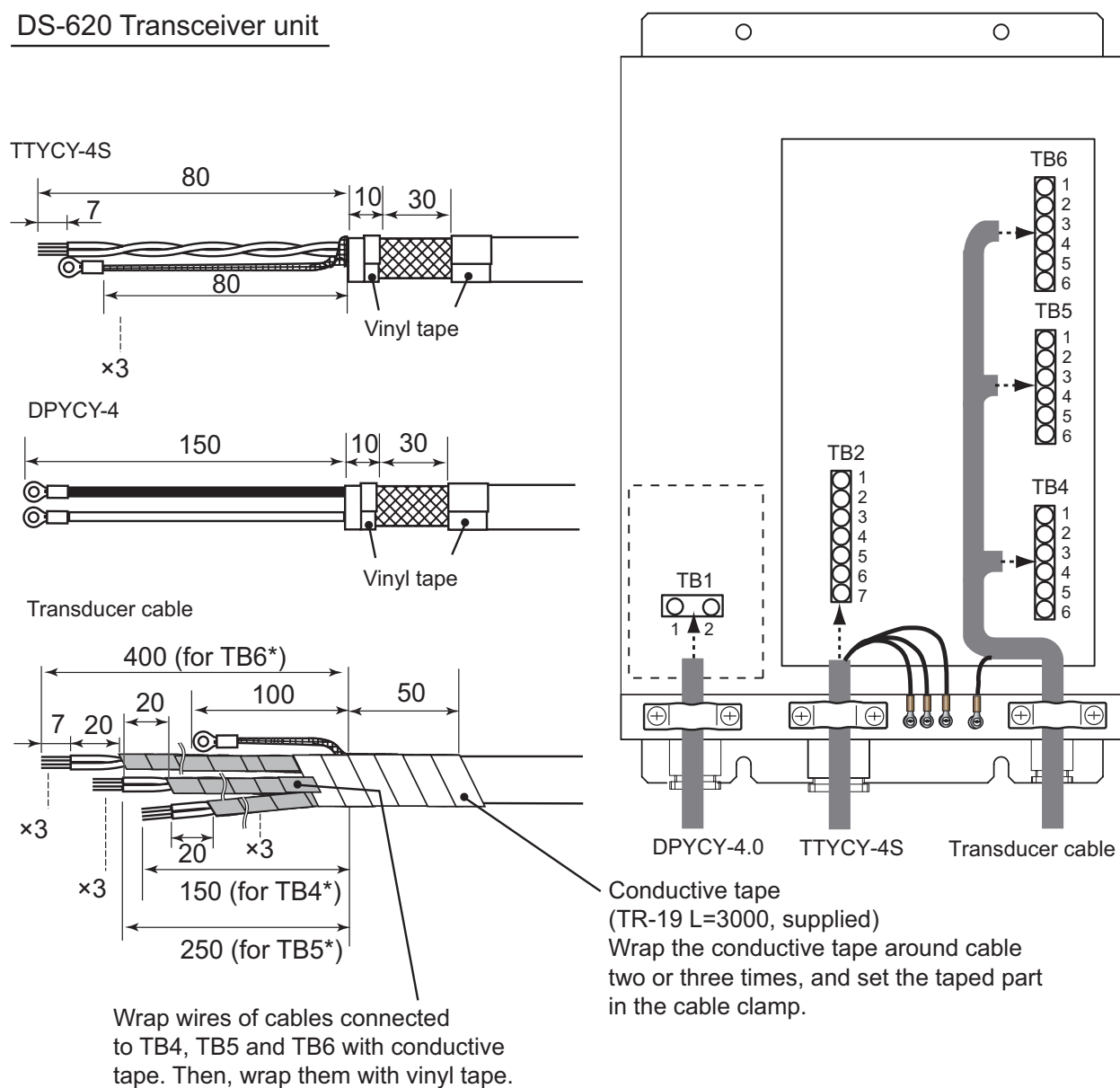




## 2.2 Transceiver Unit DS-620

Cables TTYCY-4S, DPYCY-4 and the transducer cable are connected to the DS-620. Fabricate and pass them through their respective the cable clamps at the bottom.

### DS-620 Transceiver unit



**Note:** The transducer cable has nine twisted-pairs of signal lines. Be careful to connect them to the correct connectors in the transducer unit.

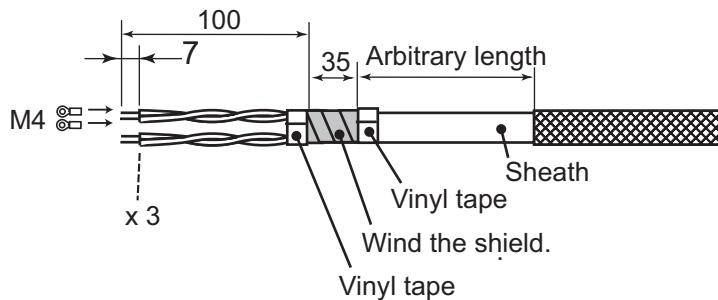
## 2.3 Display Unit DS-600, Remote Controller RD-501/ Dimmer Controller RD-502 (option)

Use the TTYCS-4 cable to connect the display unit DS-600 to the distributor.

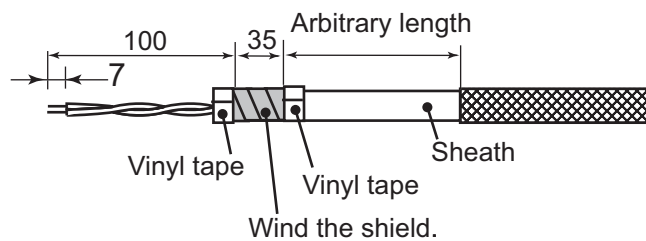
**Note:** The cable length must be less than 150 m.

### DS-600 Display unit

TTYCS-4 (TB1/2, for distributor)  
(TB3, for RD-501/502 (option))

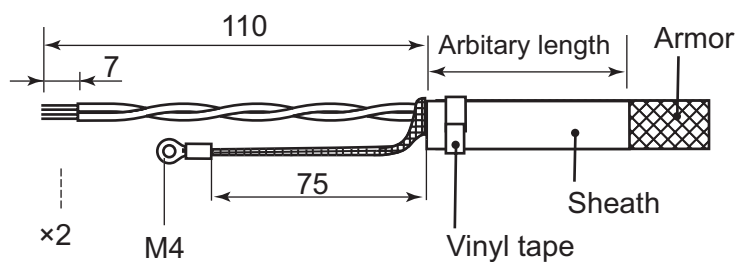


TTYCS-1 (TB4, for RD-20/50 (option))



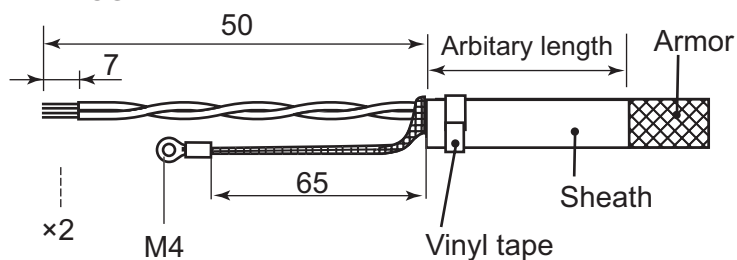
### RD-501 (end of RD-501)

TTYCS-4

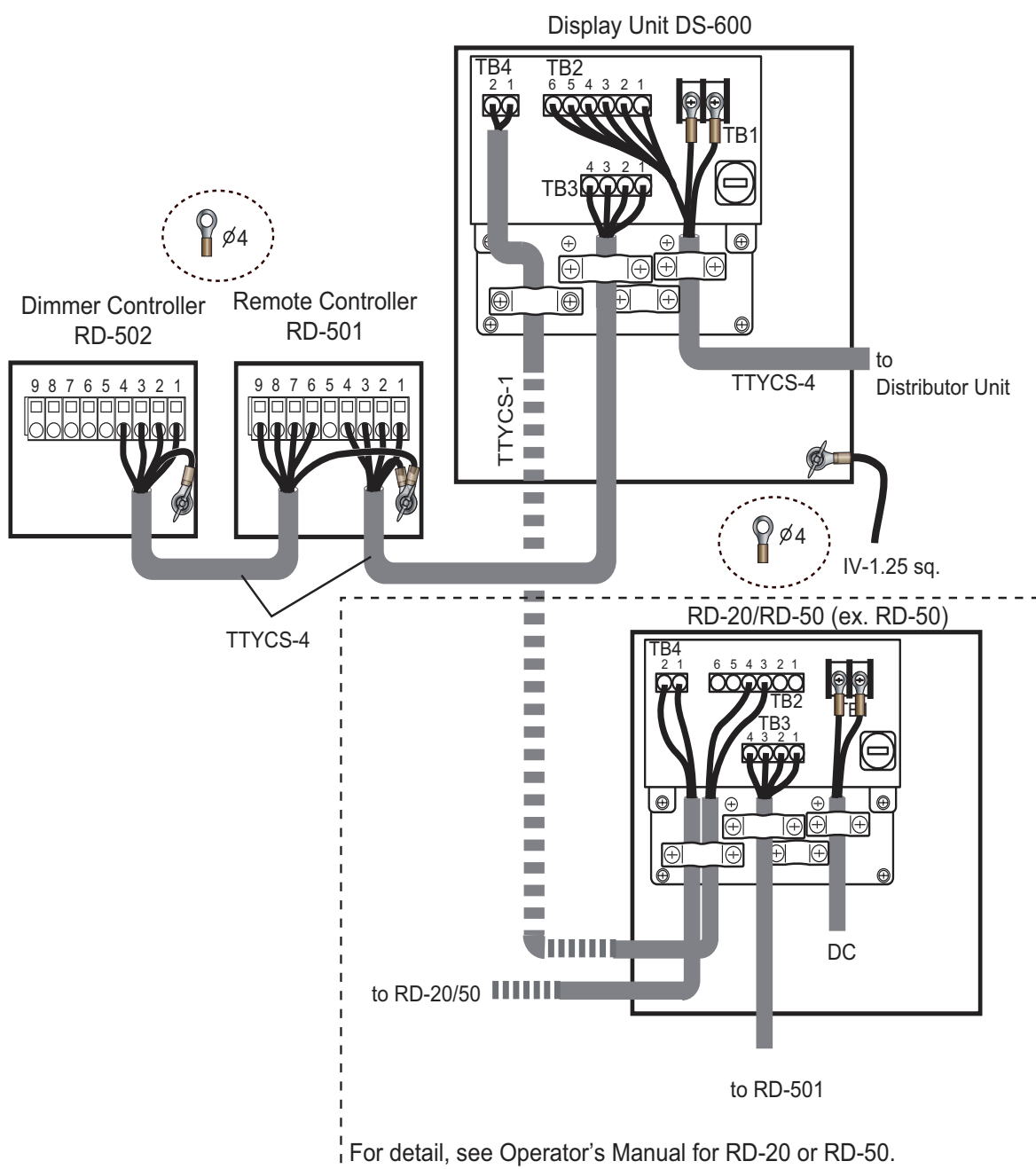


### RD-502 (end of RD-502)

TTYCS-4



Connect cables fabricated on the previous page to terminals on the back of the unit, and fix them with clamps.



*DS-600, example of connection*

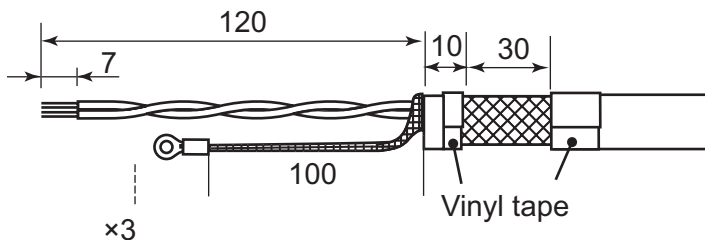
When using the optional water proof box DS-605, TTYCYS-4 cable is necessary.

## 2.4 Junction Box (DS-640, option)

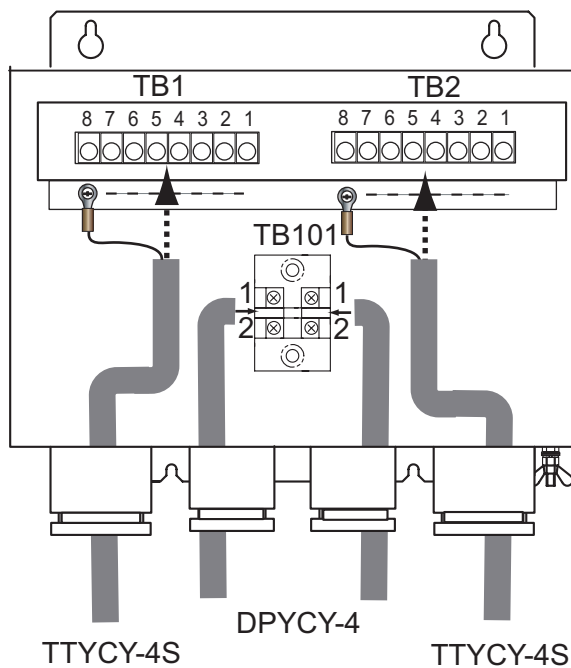
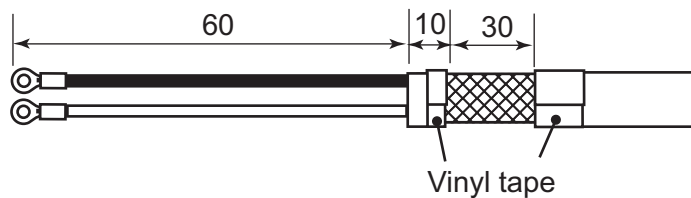
The optional Junction Box DS-640 permits extension of the cable connected between the Junction Box and the Transceiver Unit up to maximum of 500 m. Fabricate two TTYCY-4S and DPYCY-4 cables as shown below.

### DS-640 Junction Box

TB1/TB2, TTYCY-4S



TB101, DPYCY-4.0



*DS-640, internal view*

# 3. MENU SETTINGS

After the installation is completed, set up the system from the Service and System menus.

## 3.1 How to Use the Service Menu

1. Press the [PWR] key while pressing the [DISP] key to show the Service menu.

Operation	: Main
I/O Port	
Output Data Format	: IEC61162-2 Ed.1
Input Data Format	: IEC
IEC61162 IN Monitor	
SIO Monitor	
Setting Ship's Data	
Ship's Name	: 0000000000
IMO	: 0000000000
Reference Point	: Center
Alarm Buzzer	: ON
Alarm Hysteresis	: 0.0kn
L/L digit	: 4digit
Used Time	
LCD RESET	
DS-340 RESET	
[▲]/[▼]: Select	
[ENT]: Enter	

Service menu

2. Press ▲ or ▼ to select a menu item, and press the [ENT] key to show the setting window.
3. Press ▲ or ▼ to change the setting, and press the [ENT] key. To return to the menu, press the [MENU/ESC] key.

To enter alphanumeric data; for example, Ship's Name, do the following:

- 1) A character input box appears, with the input cursor at the far-left position.

Input cursor →

SET	
▲	0 0 0 0 0 0 0 0 0 0
▼	
(0~9 A~Z . _ - /space)	
[▲]/[▼]: Select	
[ENT]: Enter	
[MENU/ESC]: Cancel	

- 2) Press ▲ or ▼ to select character.
- 3) Press the [ENT] key to confirm selection.
- 4) Repeat steps 2) and 3) to complete the item.

You can move the input cursor with the [ENT] and [MENU/ESC] keys.

[ENT]: Move right.

[MENU/ESC]: Move left.

4. Repeat steps 2 and 3 to complete the setting.

For items to be set at the installation, see the table on next page.

5. Press the [PWR] key to turn the power off.

### 3. MENU SETTINGS

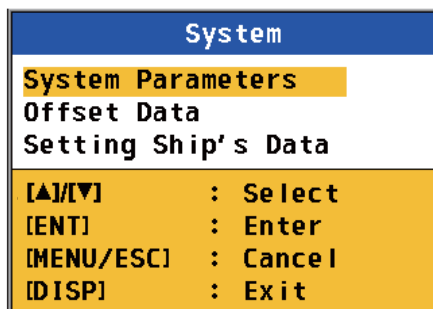
Menu item			Meaning	Option (default in boldface)
Operation			Select Main or Sub to use. (For the display unit connected to TB7 in DS-610, select Main.)	Main, Sub
Output Data Format			Select the version of IEC61162 data to output from DS-610.	IEC61162-1 Ed.2 <b>IEC61162-1 Ed.3</b> IEC61162-2 Ed.1
Input Data Format	IEC	61162_IN_1	Select IEC data format input to the channel 1 of the IN port, TB2-#1, 2 in DS-610. (main display only)	IEC61162-1 Ed.2 <b>IEC61162-1 Ed.3</b> IEC61162-2 Ed.1
		61162_IN_2	Select IEC data format to input to the channel 2 of the IN port, TB2-#3, 4 in DS-610. (main display only)	
		61162_IN_3	Select IEC data format to input to the channel 3 of the IN port, TB2-#5, 6 in DS-610. (main display only)	
	NMEA	61162_IN_1	Select NMEA data baud rate to input to the channel 1 of the IN port, TB2-#1, 2 in DS-610. (main display only)	<b>4800</b> 38400
		61162_IN_2	Select NMEA data baud rate to input to the channel 2 of the IN port, TB2-#3, 4 in DS-610. (main display only)	
		61162_IN_3	Select NMEA data baud rate to input to the channel 3 of the IN port, TB2-#5, 6 in DS-610. (main display only)	
	IEC61162 IN Monitor		Monitor the IEC input signal described above. (main display only)	
	SIO Monitor		Monitor the serial signal input to the display units. (main and sub)	
	Reference Point			Select the reference position to use to calculate ship's speed. (main display only)
Alarm Buzzer			Select ON to get the audio alarm when an alarm is violated. (main display only)	<b>ON</b> , OFF
Alarm Hysteresis			Set the amount of tolerance to apply to the Speed Limit alarm. For example, if you set "1 kn" here and "30 kn" for the Speed Limit alarm, that alarm is cancelled when ship's speed drops to 29 kn from 30 kn.	0 to 5 kn
L/L digit			Set the number of digits to show for the minutes indication in latitude and longitude position.	3 digit, <b>4 digit</b>
Others			For the serviceman. These are not used at the installation.	

## 3.2 How to Set the System Menu

Set the items on the System menu after completing those on the System menu.

### 3.2.1 How to show the System menu

1. Press the [PWR] key to turn the power on.
2. Press the [MENU/ESC] key to show the main menu.
3. Press ▼ to select [System], and press the [ENT] key.

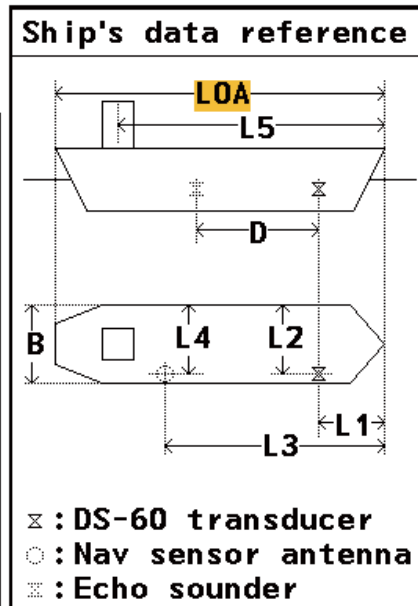
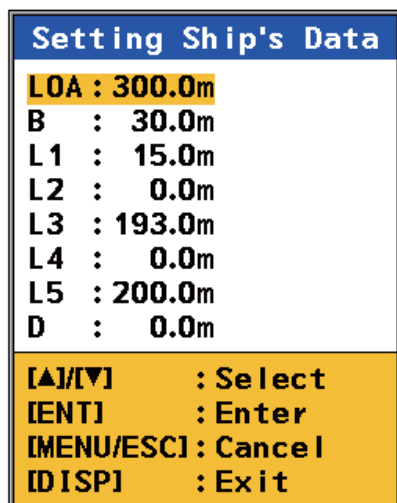


System menu

### 3.2.2 How to set ship's data

Enter the dimensions of your ship on the Setting Ships Data menu.

1. Press ▼ to select [Setting Ship's Data], and press the [ENT] key to show the Setting Ships Data menu.



Setting Ship's Data menu

### 3. MENU SETTINGS

2. Select an item, and press the [ENT] key to show the setting window.

Refer to the table in below to enter the dimensions.

Item	Meaning	Setting range
LOA	Ship's length	50.0 to 400.0 m
B	Ship's width	5.0 to 100.0 m
L1	Horizontal distance from the ship's bow to transducer	0.0 m to the setting value for "LOA"
L2	Horizontal distance from port to transducer	0.0 m to the setting value for "B"
L3	Horizontal distance from ship's bow to GPS antenna	0.0 m to the setting value for "LOA"
L4	Horizontal distance from port to GPS antenna	0.0 m to setting value for "B"
L5	Horizontal distance from ship's bow and CCRP (bridge)	0.0 m to setting value for "LOA"
D	Horizontal distance between transducers for DS-60 and echo sounder.	0.0 m to ("LOA"-L1)

3. Press the [MENU/ESC] key to close the menu.

### 3.2.3 How to enter offset values

1. Press ▲ to select [Offset Data], and [ENT] key to show the Offset Data menu.

Offset Data		
Trim	:	0.0deg
Heel	:	0.0deg
XDCR	:	0.0deg
Compass Calibration	:	0.0deg
SOG Calibration	:	0.0%
STW Calibration	:	0.0%
[▲]/[▼] : Select		
[ENT] : Enter		
[MENU/ESC] : Cancel		
[DISP] : Exit		

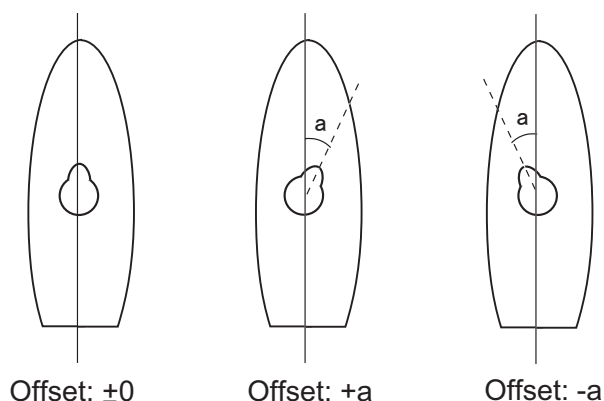
2. Select [Trim], and press the [ENT] key.

SET	
▲	
0.0deg	
▼	
(-12.5~+12.5)	
Step 0.1deg	
[▲]/[▼] : Select	
[ENT] : Enter	
[MENU/ESC] : Cancel	
[DISP] : Exit	

3. Enter the offset value for inclined angle, and press the [ENT] key (setting range: -12.5 to +12.5°, +: rise at bow).
4. Press ▼ to select [Heel], and press the [ENT] key.
5. Enter the offset value for the heel, and press the [ENT] key (setting range: -12.5 to +12.5°, +: rise at port).
6. Press ▼ to select [XDCR], and press the [ENT] key.



7. Enter the offset value if transducer is not installed perfectly with ship's fore-aft line (setting range: -60.0 to +60.0°). Measure the difference between ship's fore-aft line and the line on the transducer, and enter it.



### 3.2.4 How to correct the ship's speed

Correct the speed error using the test sheet at the back of this manual.

1. Press ▼ to select [SOG Calibration], and press the [ENT] key.
2. Enter the offset value for the speed over ground, and press the [ENT] key (setting range: -12.5 to +12.5%).
3. Press ▼ to select [STW Calibration], and press the [ENT] key.
4. Enter the offset value for the speed through water, and press the [ENT] key (setting range -12.5 to +12.5%).
5. Press the [MENU/ESC] key several times to close the menu.

### 3. MENU SETTINGS

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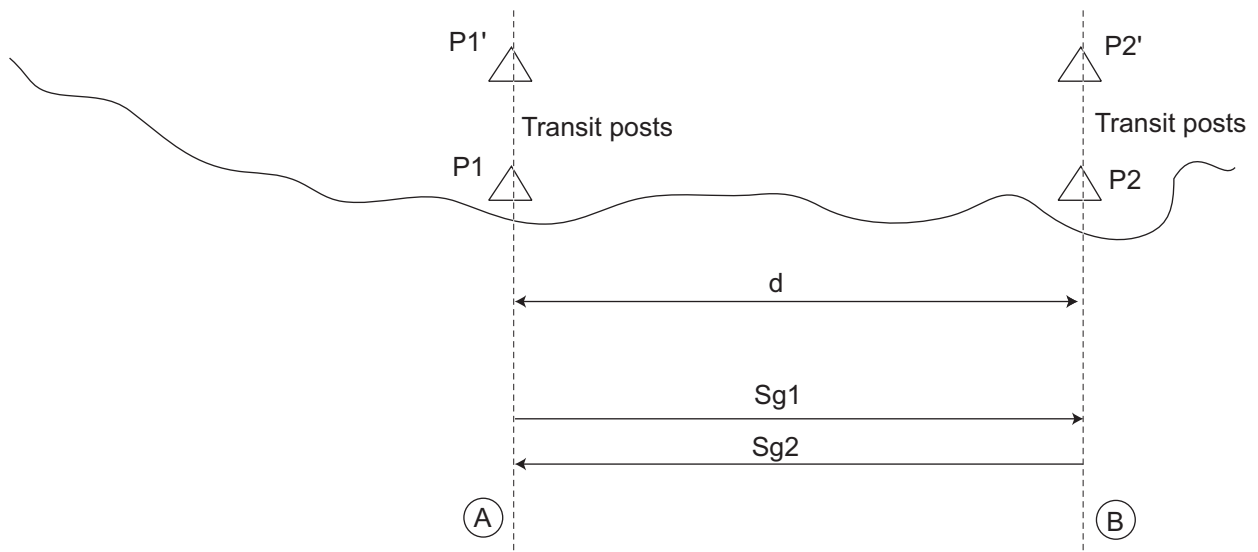
# APPENDIX 1 CALIBRATION

## Milepost run

It is common practice to check a new ship's performance at an official trial run. Take this opportunity to calibrate the DS-60. In practice, the ship speed is evaluated as follows.

### 1. Calculation with transit posts

Steer the ship at a steady speed on the test course, e.g. A→B in the illustration. Speed is obtained from the following equations. Note that Sg1 and Sg2 are both speeds over the ground (SOG); however the DS-60 provides the speed through the water. To find the speed through the water, a return trip is necessary.



$$Sg1 = d/t1 \times 3600 \text{ (kn)} \dots (1)$$

$$Sg2 = d/t2 \times 3600 \text{ (kn)} \dots (2)$$

$$Sw + St = Sg1 \text{ (kn)} \dots (3)$$

$$Sw - St = Sg2 \text{ (kn)} \dots (4)$$

Adding (4) and (3), we get;

$$2Sw = Sg1 + Sg2 \text{ (kn)}$$

$$\text{Therefore, } Sw = (Sg1 + Sg2)/2 \text{ (kn)} \dots (5)$$

where,

d = distance run (nm),

t1 = time taken to run 1 (second),

t2 = time taken to run 2 (second). (Note: Runs 1 and 2 are in opposite direction.)

Sw = Speed through the water (kn),

St. = Speed of tide current (kn),

Sg1 = SOG for run 1 (kn),

Sg2 = SOG for run 2 (kn).

Thus we can find a speed through the water by making a round trip.

## 2. Calculation with DS-60

To measure the distance run between points A and B by DS-60, do the following:

1. Reset the distance run figure of DS-60 to zero by selecting Reset on the Trip DIST menu at the moment the ship passes point A.
2. Run the ship from A to B at full speed, timing with a stopwatch.
3. Read the distance run (nm) and time taken to run (second) exactly at the moment the shipshape point B.
4. Run the ship from B to A at full speed rehearing to step 1 through 3.

Where,

$n1$  (nm) = distance run from A to B measured by DS-60

$n2$  (nm) = distance run from B or A measured by DS-60

Therefore, the average run from A to B measured by DS-60

Therefore, the average ship speeds of run 1 and run 2 are calculated as follows.

$Slog1$  (kn) =  $n1/t1 \times 3600$

$Slog2$  (kn) =  $n2/t1 \times 3600$

The average ship speed of round trip is  $Slog$  (kn) =  $(Slog1 + Slog2)/2 \dots(6)$

## 3. Speedily error

From (5) and (6),

Error =  $(Sw - Slog)/Slog \times 100$  (%)... (7)

This error can be corrected at SPEED OFFSET on the system menu as follows:

1. Press the [MENU/ESC] key.
2. Select SYSTEM MENU and press the [ENT] key.
3. Select SPEED OFFSET and press the [ENT] key.
4. Enter the value of error.

Repeat the above procedure several times to satisfy the speed accuracy specification.

CALIBRATION SHEET FOR DS-60

TEST SITE \_\_\_\_\_ SHIP'S LENGTH \_\_\_\_\_ (m) DRAFT Fore \_\_\_\_\_ Aft \_\_\_\_\_ Mean \_\_\_\_\_ (m)

NAME \_\_\_\_\_ Ser. No. \_\_\_\_\_ DOCKYARD \_\_\_\_\_ TRIM \_\_\_\_\_ DATE: \_\_\_\_\_

Run No	Time	Engine		Milepost		Speed		Doppler speed log		EM-Log	Depth	Course	Wind	Sea state	Current	Remarks
		Out	RPM	kn	Time (s)	kn	Time (s)	Distance run	Error							
										(kn)	(m)	(deg)	(m/s)		(kn)	
Mean																
Mean																
Mean																
Mean																
Mean																
Mean																

# APPENDIX 2 JIS CABLE GUIDE

Cables listed in the manual are usually shown as Japanese Industrial Standard (JIS). Use the following guide to locate an equivalent cable locally.

JIS cable names may have up to 6 alphabetical characters, followed by a dash and a numerical value (example: DPYC-2.5). For core types D and T, the numerical designation indicates the *cross-sectional Area (mm<sup>2</sup>)* of the core wire(s) in the cable. For core types M and TT, the numerical designation indicates the *number of core wires* in the cable.

## 1. Core Type

D Double core power line

T Triple core power line

M 1mm Multi core

TT 0.75mm twisted pair communications (1Q = quad cable)

## 2. Insulation Type

P Ethylene Propylene

## 3. Sheath Type

Y Vinyl

## 4. Armor Type

C Steel

## 5. Shielding Type

Y Corrosive resistant

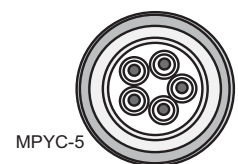
## 6. Core Sheath

S All cores in one sheath

-S Individually sheathed cores

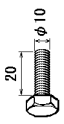
EX: <sup>1 2 3 4 5 6</sup>DPYCS - 1.5      <sup>1 2 3 4</sup>MPYC - 5

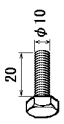
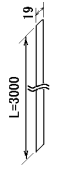
Designation type      Core Area (mm<sup>2</sup>)      Designation type      # of cores



The following reference table lists gives the measurements of JIS cables commonly used with Furuno products:

Type	Core		Cable Diameter		Type	Core		Cable Diameter
	Area	Diameter				Area	Diameter	
DPYC-1.5	1.5mm <sup>2</sup>	1.56mm	11.7mm		TTYCS-4	0.75mm <sup>2</sup>	1.11mm	16.3mm
DPYC-2.5	2.5mm <sup>2</sup>	2.01mm	12.8mm		TTYCY-4S	0.75mm <sup>2</sup>	1.11mm	17.7mm
DPYC-4	2.5mm <sup>2</sup>	2.01mm	13.9mm		TTYCYS-1	0.75mm <sup>2</sup>	1.11mm	12.1mm
DPYCY-4	2.5mm <sup>2</sup>	2.55mm	15.9mm		TTYCYS-4	0.75mm <sup>2</sup>	1.11mm	18.5mm
DPYCY-2.5	2.5mm <sup>2</sup>	2.01mm	14.8mm		TPYCY-1.5	1.5mm <sup>2</sup>	1.56mm	14.5mm
DPYCYS-1.5	1.5mm <sup>2</sup>	1.56mm	14.6mm		TPYCY-2.5	2.5mm <sup>2</sup>	2.01mm	15.5mm
DPYCYS-2.5	2.5mm <sup>2</sup>	2.01mm	15.5mm		TPYCY-4	4mm <sup>2</sup>	2.55mm	16.9mm
MPYC-2	1mm <sup>2</sup>	1.29mm	10.0mm		TPYCYS-1.5	1.5mm <sup>2</sup>	1.56mm	15.2mm
MPYC-4	1mm <sup>2</sup>	1.29mm	11.2mm					
MPYC-7	1mm <sup>2</sup>	1.29mm	13.2mm					
MPYCY-12	1mm <sup>2</sup>	1.29mm	19.0mm					
MPYCY-19	1mm <sup>2</sup>	1.29mm	22.0mm					
TTYC-7S	0.75mm <sup>2</sup>	1.11mm	18.7mm					
TTYCS-1	0.75mm <sup>2</sup>	1.11mm	10.1mm					
TTYCS-1Q	0.75mm <sup>2</sup>	1.11mm	11.3mm					

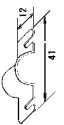
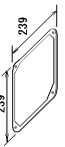

工事材料表		INSTALLATION MATERIALS				66AT-X-9405 -0		1/1
番号 NO.	名 称 NAME	略 図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS			
						CODE NO.	TYPE	
1	六角ボルト HEX. BOLT		M10X20 SUS304 CODE NO. 000-162-779-10	4		001-082-190-00	CP66-01701	

工事材料表			DS-620				66AT-X-9411 -0		1/1	
INSTALLATION MATERIALS							001-082-290-00		CP66-01702	
番号 NO.	名 称 NAME	略 図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS		CODE NO.	TYPE		
1	六角ボルト HEX BOLT		M10X20 SUS304 CODE NO. 000-162-779-10	4						
2	導電テープ SHIELDING TAPE		TR-19 L=3000 CODE NO. 000-173-067-10	1						

型式／コード番号が2段の場合、下段より上段に代わる通達製品であり、どちらかが入っています。なお、品質は変わりません。  
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT.  
QUALITY IS THE SAME.  
(概図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

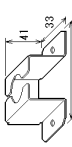

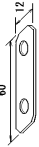

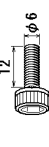
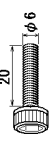
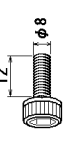



型式／コード番号が2段の場合、下段より上段に代わる通達製品であり、どちらかが入っています。なお、品質は変わりません。  
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QUALITY IS THE SAME.  
(概図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

CODE NO.	001-081-900-00	26AC-X-9403-2
TYPE	CP26-01501	1/1

工 事 材 料 表			INSTALLATION MATERIALS		
番 号 NO.	名 称 NAME	略 図 OUTLINE	型 名／規格 DESCRIPTIONS	数 量 Q'TY	用 途／備 考 REMARKS
1	ケーブ クランプ (2) CABLE CLAMP (2)		26-003-1528-0 CODE NO. 100-355-110-10	1	
2	フラッシュマウンティング FLUSH MOUNTING SPONGE		26-003-1532-1 CODE NO. 100-355-201-10	1	
3	タッピングネジ TAPPING SCREW		5K20 SUS304 CODE NO. 000-171-997-10	4	

型式/コード番号が2段の場合、下段より上段に代わる通称部品であり、どちらかが入っています。なお、品質は変わりません。  
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT.  
QUALITY IS THE SAME.  
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

CODE NO.	001-082-640-00	66AT-X-9407-0
TYPE	CP66-01704	1/1

工事材料表		INSTALLATION MATERIALS		DS-631			
番号 NO.	名 称 NAME	略 図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q T Y	用途／備考 REMARKS		
1	コナリ固定金具 METAL FIXING FOR CONNECTOR		66-027-6019-0 CODE NO. 100-354-690-10	1			
2	ｸﾞﾛﾒｯﾄ GROMMET		66-027-6021-0 CODE NO. 100-354-700-10	1			
3	ﾎﾞｰﾄﾞ ｾｯﾌﾟﾏﾅﾌﾞ CABLE FIXING PLATE		66-027-6022-0 CODE NO. 100-354-710-10	1			
4	ﾊﾞｯｼﾞ座金 SPRING WASHER		M6 SUS316L CODE NO. 000-163-735-10	4			
5	六角穴付ﾍﾞﾙﾄ HEXAGONAL HEAD BOLT		M6X12 SUS316L CODE NO. 000-172-253-10	2			
6	六角穴付ﾍﾞﾙﾄ HEXAGONAL HEAD BOLT		M6X20 SUS316L CODE NO. 000-162-745-10	2			
7	六角穴付ﾍﾞﾙﾄ HEXAGONAL HEAD BOLT		M6X12 SUS316L CODE NO. 000-172-255-10	4			
8	ｼｰﾙﾜｯｼｬ SEAL WASHER		SUS W8 CODE NO. 000-167-584-10	4			
9	ｴﾃﾞｼﾞ ﾎﾛｶﾞ ﾏｲﾌﾟﾄ LIQUID GASKETS		TBI194 200G CODE NO. 000-164-260-10	1			
10	ｼﾘｺﾝｸﾞﾘｰｽﾞ GREASE		G-30M-100 CODE NO. 000-169-306-10	1			

型式/コード番号が2段の場合、下段より上段に代わる通称部品であり、どちらかが入っています。なお、品質は変わりません。  
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QUALITY IS THE SAME.  
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

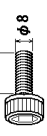

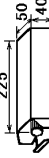


CODE NO.	001-082-630-00
TYPE	CP66-01703










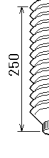
CODE NO.	001-082-800-00
TYPE	CP66-01711

CODE NO.	001-082-800-00
TYPE	CP66-01711

66AT-X-9406 -0
1/1


工事材料表				INSTALLATION MATERIALS			
番号 NO.	名 称 NAME	略 図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS		
1	六角穴付ボルト HEXAGONAL HEAD BOLT		M8X12 SUS316L CODE NO. 000-172-2655-10	4			
2	シールワッシャー SEAL WASHER		SUS W8 CODE NO. 000-167-5884-10	4			
3	液状シール LIQUID GASKETS		TB1194 200G CODE NO. 000-164-260-10	1			

型式／コード番号が2段の場合、下段より上段に代わる通称製品であり、どちらかが入っています。なお、品質は変わりません。  
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT.  
QUALITY IS THE SAME.  
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

工事材料表				INSTALLATION MATERIALS			
DS-661							
番号 NO.	名 称 NAME	略 図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS		
1	防水座金 WATERPROOF WASHER		66-027-7206-1 CODE NO. 100-354-071-10	1			
2	防水ハット WATERPROOF GASKET		66-027-7207-1 CODE NO. 100-354-081-10	1			
3	ケーブル用締付 CABLE GLAND NIPPLE		JIS F8801 2037 CODE NO. 000-171-874-10	1			
4	六角ナット HEXAGONAL NUT		M12 SUS316L CODE NO. 000-167-494-10	8			
5	平座金 FLAT WASHER		M12 SUS316L CODE NO. 000-167-417-10	4			
6	ハット座金 SPRING WASHER		M12 SUS316L CODE NO. 000-167-396-10	4			
7	六角ナット HEXAGONAL NUT		M20 SUS316L CODE NO. 000-167-402-10	16			
8	ハット座金 SPRING WASHER		M20 SUS316L CODE NO. 000-167-402-10	16			
9	六角ヘッド HEXAGONAL HEAD BOLT		M20X75 SUS316L CODE NO. 000-172-024-10	8			
10	グリース GREASE		No. 1 400G シェパード CODE NO. 000-165-774-10	1			

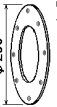
型式／コード番号が2段の場合、下段より上段に代わる通称製品であり、どちらかが入っています。なお、品質は変わりません。  
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CODE NO.	001-082-830-00	66AT-X-9408 -0
TYPE	CP66-01710	1/1

工 事 材 料 表			DS-661		
INSTALLATION MATERIALS					
番 号 NO.	名 称 NAME	略 図 OUTLINE	型 名 / 規 格 DESCRIPTIONS	数 量 Q'TY	用 途 / 備 考 REMARKS
1	グリース GREASE		No.1 400G シェパ グリース CODE NO. 1000-16S-774-10	1	

型式/コード番号が2段の場合、下段より上段に代わる通称部品であり、どちらかが入っています。なお、品質は変わりません。  
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT.  
QUALITY IS THE SAME.  
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

CODE NO.	001-082-820-00	66AT-X-9410 -0
TYPE	CP66-01712	1/1

工 事 材 料 表			DS-661		
INSTALLATION MATERIALS					
番 号 NO.	名 称 NAME	略 図 OUTLINE	型 名 / 規 格 DESCRIPTIONS	数 量 Q'TY	用 途 / 備 考 REMARKS
1	ガスケット GASKET		66-027-7203-0	2	
			CODE NO. 100-354-040-10		

型式/コード番号が2段の場合、下段より上段に代わる通称部品であり、どちらかが入っています。なお、品質は変わりません。  
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QUALITY IS THE SAME.  
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

SHIP NO.		SPARE PARTS LIST FOR		U S E		CODE NO.		26AB-X-9301 -1 1/1	
						TYPE		BOX NO. P	
						SP26-00101			

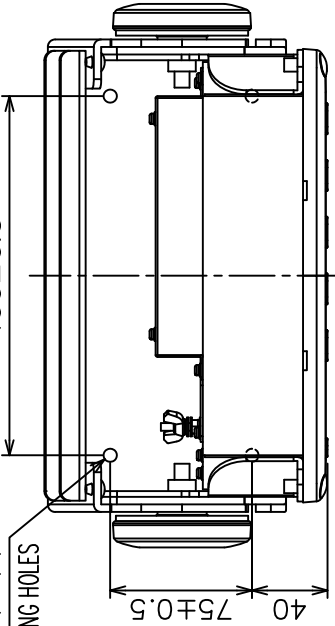
FURUNO

SHIP NO.		SPARE PARTS LIST FOR		U S E			66AT-X-9302 -0 1/1	

取付穴  
4-φ7

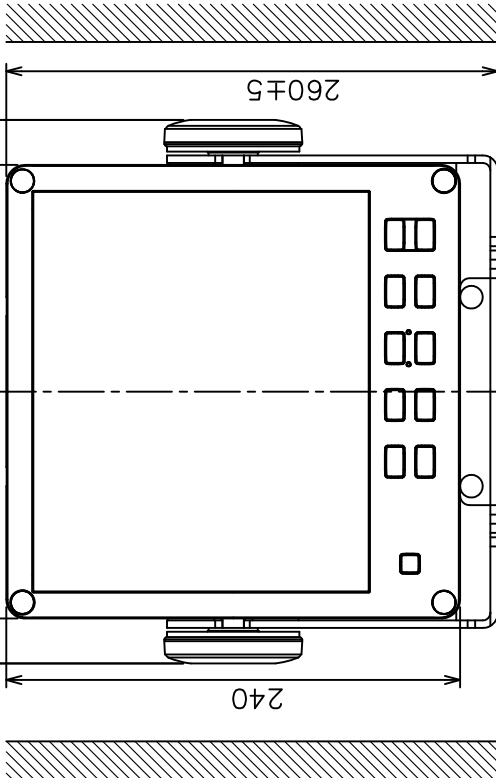
FIXING HOLES

190±0.5



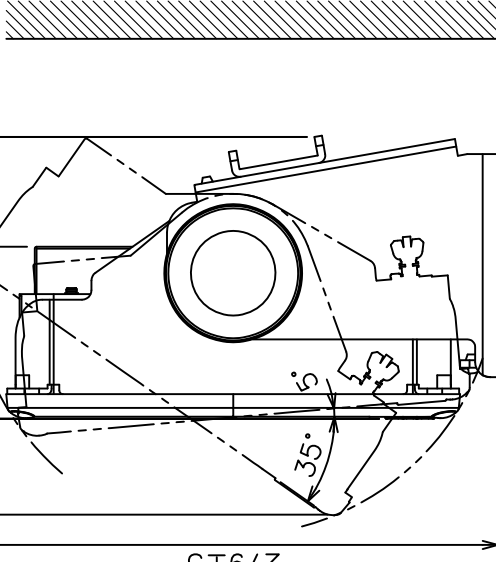
#80 288±5 #80

240



51±5 149 #150

91



279±5

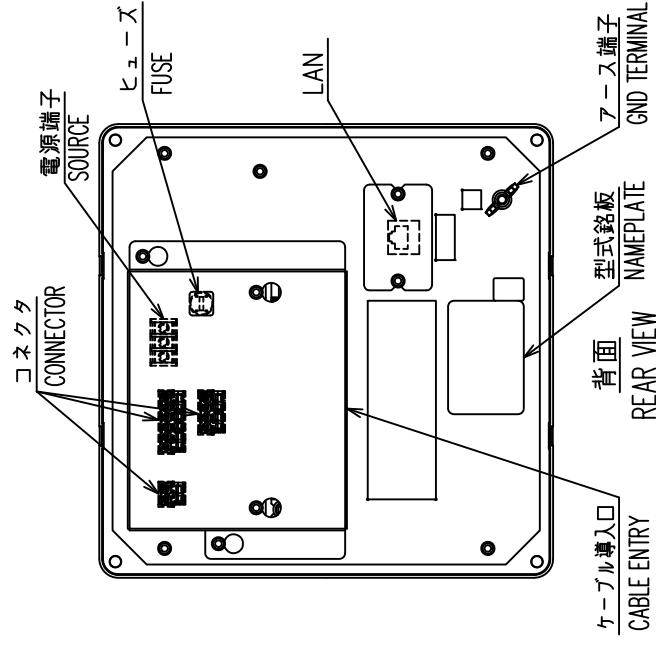
#80

260±5

240

表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3



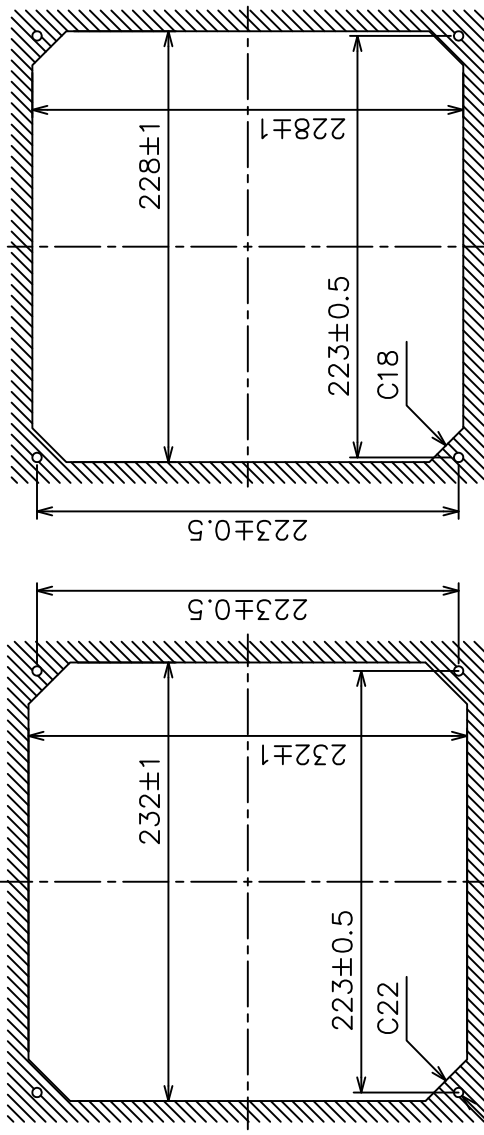
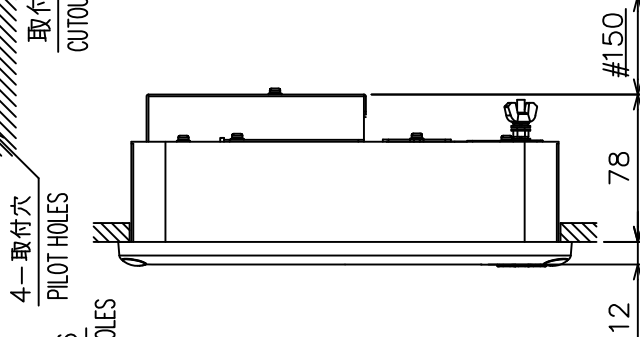
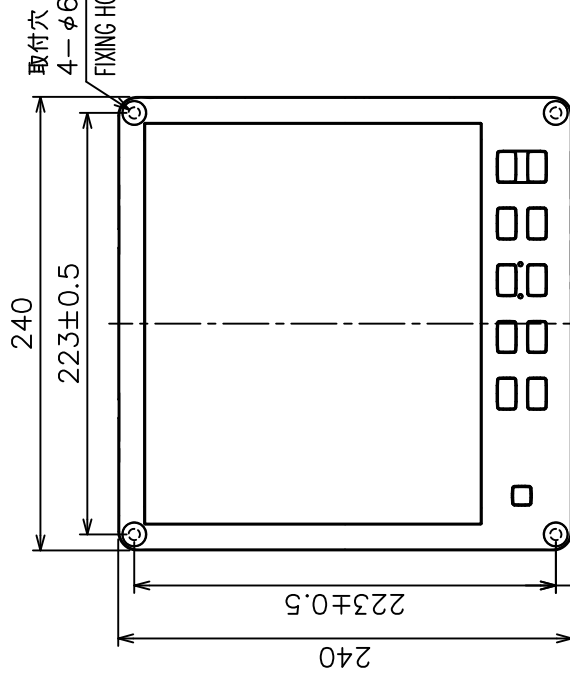
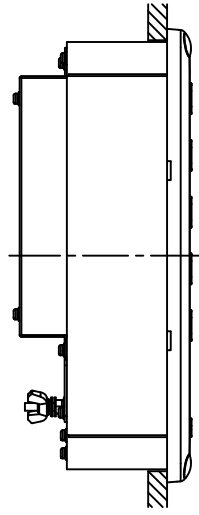
背面  
REAR VIEW

- 注記 1) 指定外の寸法公差は表 1 による。  
2) #印寸法は最小サービスクリアランスとする。  
3) 取付用ネジはバイネジ呼び径 5 × 2.0 を使用のこと。
- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
2. #: MINIMUM SERVICE CLEARANCE.  
3. USE BIND TAPPING SCREWS Ø5×2.0 FOR FIXING THE UNIT.

DRAWN	5/Mar/2010	I.YAMASAKI	TITLE	DS-600
CHECKED	5/Mar/2010	I.TAKAHASHI	名称	指示器 (卓上装備)
APPROVED			外寸図	
SCALE	1/4	WASS 3.3 kg	NAME	DISPLAY UNIT (TABLETOP MOUNT)
DWG.No.	C7264-G01-C	REF.No.	66-027-101G-5	OUTLINE DRAWING

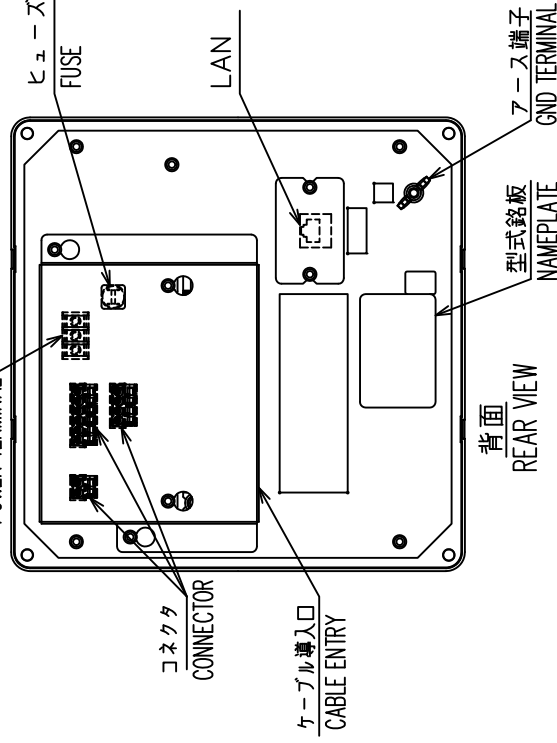
表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3



取付穴寸法 (屋内装備時)  
CUTOUT DIMENSIONS (INDOOR INSTALLATION)

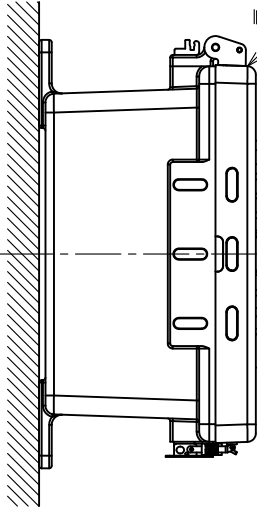
取付穴寸法 (屋外装備時)  
CUTOUT DIMENSIONS (OUTDOOR INSTALLATION)



背面  
REAR VIEW

- 注記 1) 指定外の寸法公差は表1による。  
2) #印寸法は最小サービスクリアランスとする。  
3) 取付用ネジはバインドタッピンネジ呼び径5×20を使用のこと。
- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
2. #: MINIMUM SERVICE CLEARANCE.  
3. USE BIND TAPPING SCREWS Ø5x20 FOR FIXING THE UNIT.

DRAWN	23/Mar/2010	T.YAMASAKI	TITLE	DS-600
CHECKED	24/Mar/2010	T.TAKAHASHI	名称	指示器 (埋込装備)
APPROVED			図名	外寸図
SCALE	1/4	WASS 2.1 ±10%	NAME	DISPLAY UNIT (FLUSH MOUNT)
DWG.No.	C7264-G02-C	REF.No.	66-027-102G-5	OUTLINE DRAWING



扉 LID

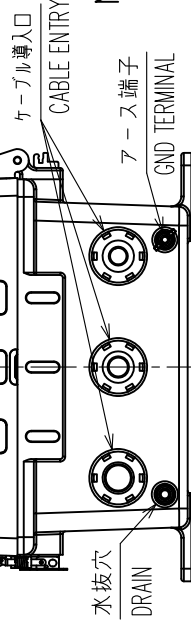
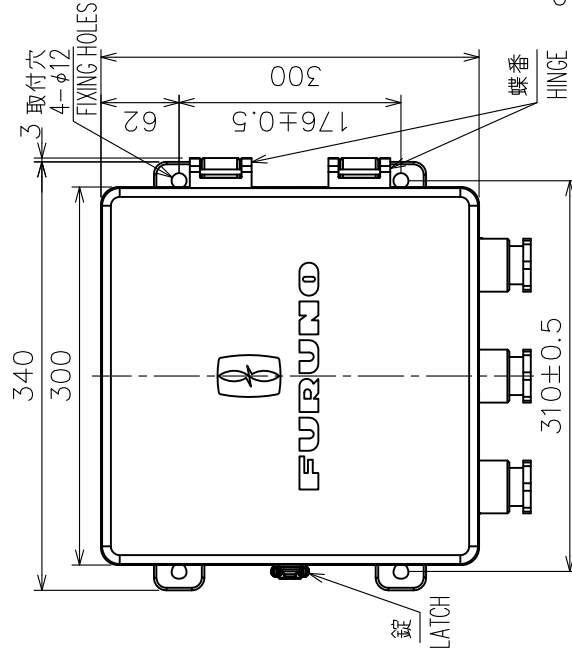
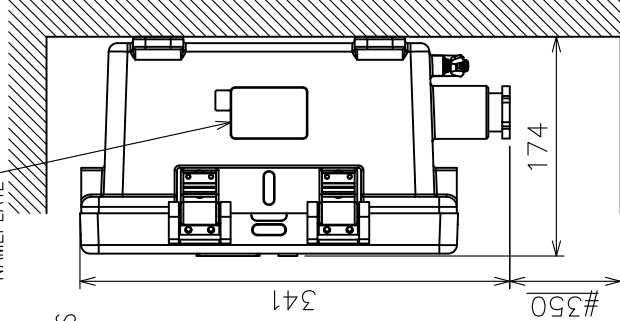


表 1 TABLE 1

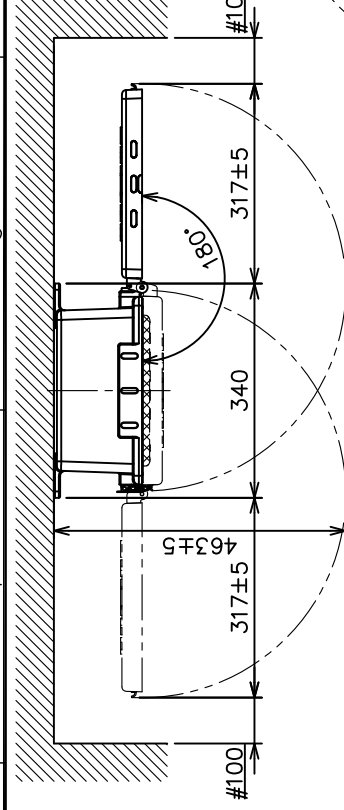
寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$

型式銘板  
NAMEPLATE



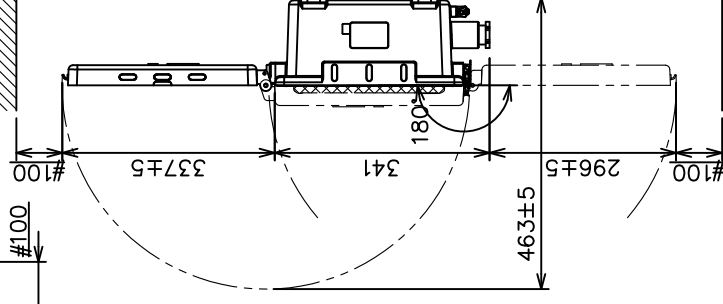
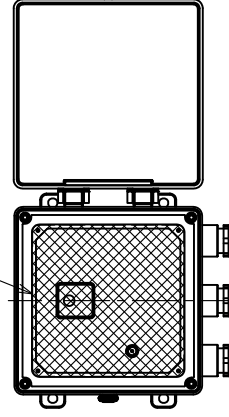
- NOTE
- TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
  - #: MINIMUM SERVICE CLEARANCE.
  - USE M10 BOLTS FOR FIXING THE UNIT.
  - EXCHANGE THE POSITION OF LATCH/HINGE TO CHANGE THE LID DIRECTION.

- 注 記
- 指定外の寸法公差は表 1 による。
  - #印寸法は最小サービス空間寸法とする。
  - 取付ネジは M10 ボルトを使用のこと。
  - 錠と蝶番の取付位置を入れ替えて、扉の開閉方向を変更出来ます。



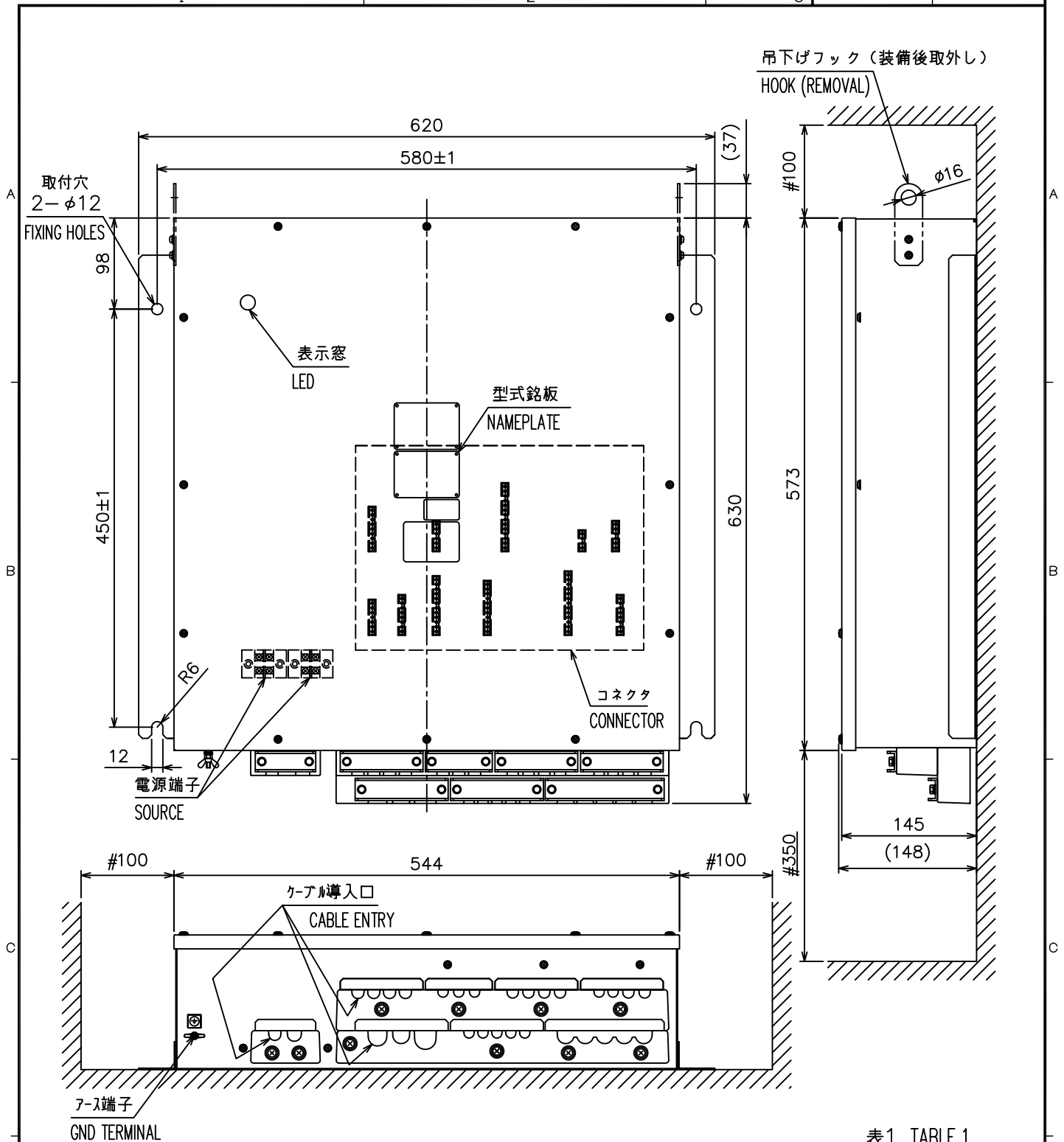
扉 右 (左) 開閉図 (尺度: 1/12)  
OPENING THE LID LEFT/RIGHT (SCALE: 1/12)

DS-600/RD-50



扉 上 (下) 開閉図 (尺度: 1/12)  
OPENING THE LID UP/DOWN (SCALE: 1/12)

DRAWN	23/Mar/2010 T.YAMASAKI	TITLE	DS-605
CHECKED	24/Mar/2010 T.TAKAHASHI	名称	防水箱
APPROVED		外寸図	
SCALE	1/6 MASS 7.0 kg	NAME	WATERPROOF BOX
DWG.No.	C7264-G05-D	REF.No.	66-027-104G-1



- 注記 1) 指定外の寸法公差は表1による。  
 2) #印寸法は最小サービス空間寸法とする。  
 3) 取付用ネジはM10ボルトを使用のこと。

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 2. #. MINIMUM SERVICE CLEARANCE.  
 3. USE M10 BOLTS FOR FIXING THE UNIT.

表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	±1.5
$50 < L \leq 100$	±2.5
$100 < L \leq 500$	±3
$500 < L \leq 1000$	±4

DRAWN	20/Nov/08 T.YAMASAKI	TITLE	DS-610
CHECKED	20/Nov/08 T.TAKENO	名称	分配器
APPROVED	9/Dec/08 R.Esumi	外寸図	
SCALE	1/6	MASS	25 ±10% kg
DWG. No.	C7264-G03- A	REF. No.	66-027-200G-B
		NAME	DISTRIBUTOR
			OUTLINE DRAWING



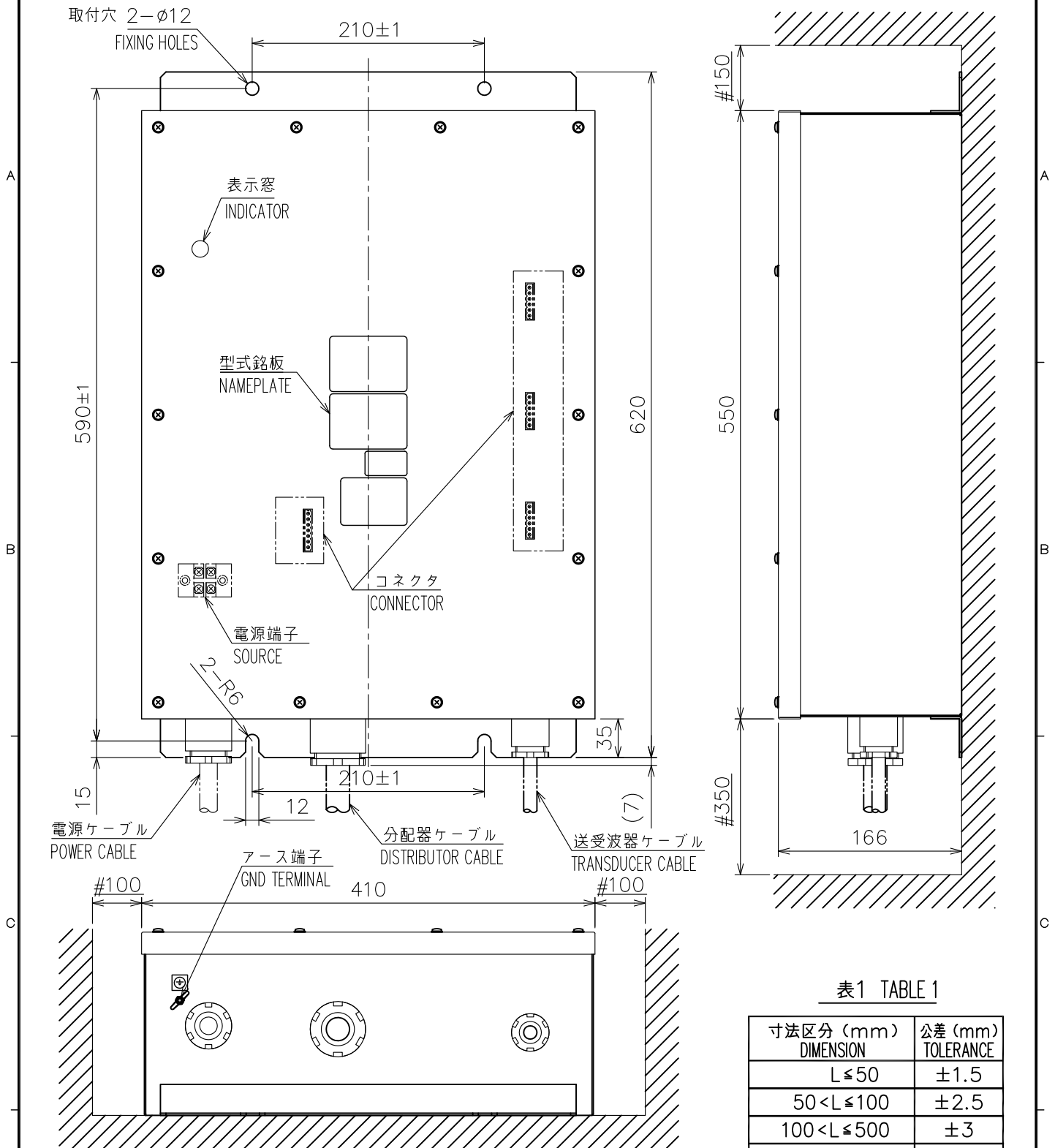


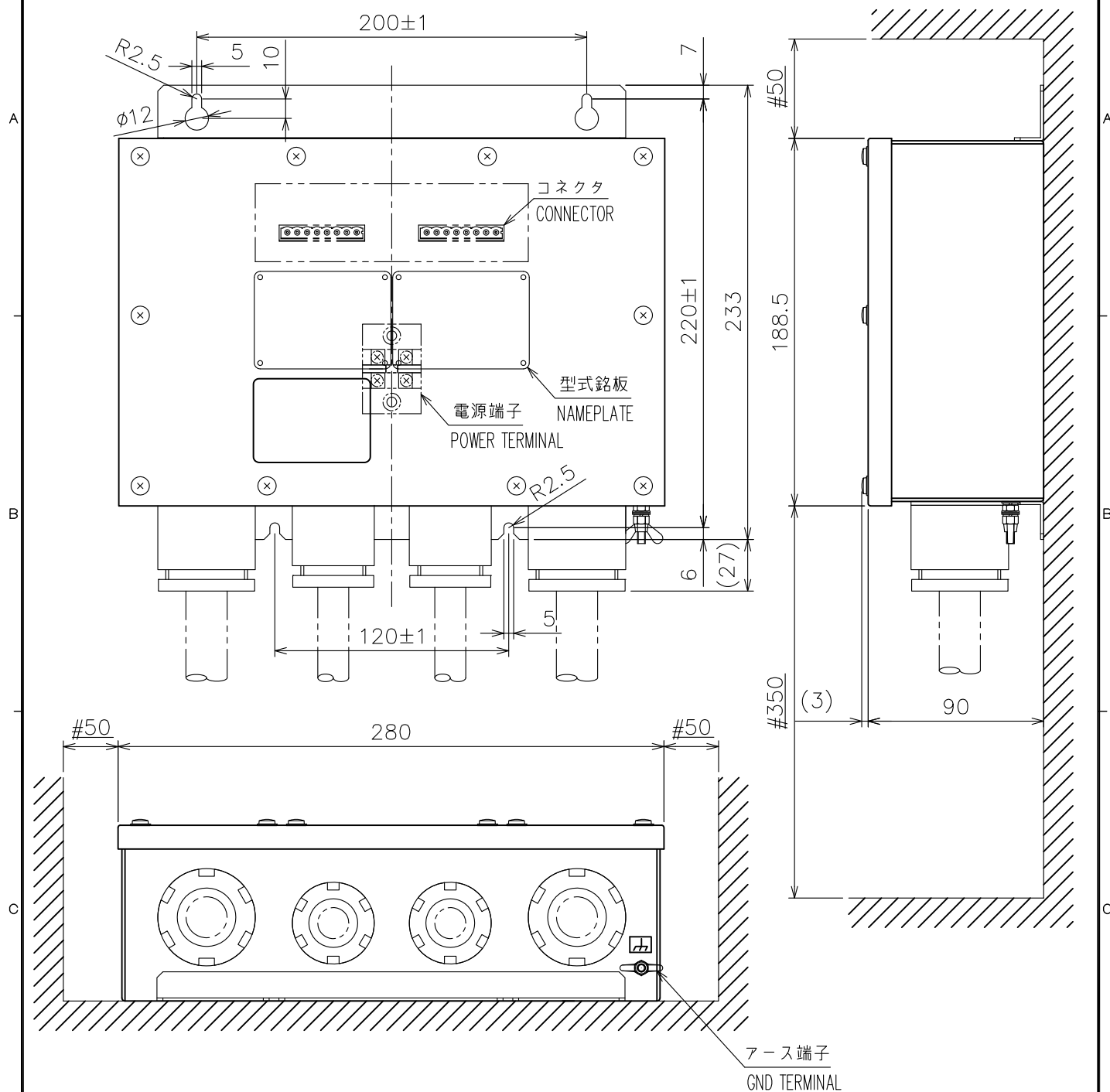
表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$
$500 < L \leq 1000$	$\pm 4$

- 注記 1) #印寸法は最小サービス空間寸法とする。  
2) 指定外の寸法公差は表1による。  
3) 取付用ネジはM10ボルトを使用のこと。

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
2. #: MINIMUM SERVICE CLEARANCE.  
3. USE M10 BOLTS FOR FIXING THE UNIT.

DRAWN	2/Mar/09 T.YAMASAKI	TITLE	DS-620
CHECKED	2/Mar/09 T.TAKENO	名称	送受信部
APPROVED	5/Mar/09 R.Esumi	外寸図	
SCALE	1/5	NAME	TRANSCEIVER UNIT
DWG. No.	C7264-G04-B	REF. No.	66-027-300G-D



- 注 記 1) 指定外の寸法公差は表 1 による。  
2) #印寸法は最小サービス空間寸法とする。  
3) 取付用ネジはトラスタッピンネジ呼び径 4×20 を使用のこと。

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
2. #: MINIMUM SERVICE CLEARANCE.  
3. USE TAPPING SCREWS  $\phi 4 \times 20$  FOR FIXING THE UNIT.

表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$

DRAWN	20/Nov/08 T.YAMASAKI		TITLE	DS-640
CHECKED	21/Nov/08 T.TAKENO		名称	接続箱
APPROVED	9/Dec/08 R.Esumi	DS-60		外寸図
SCALE	1/3	MASS $\pm 10\%$ 4.5 kg	NAME	JUNCTION BOX
DWG. No.	C7264-G06- A	REF. No.	66-027-400G-B	OUTLINE DRAWING

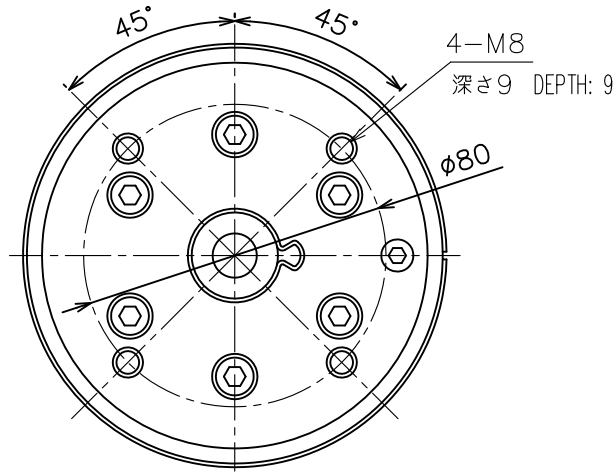
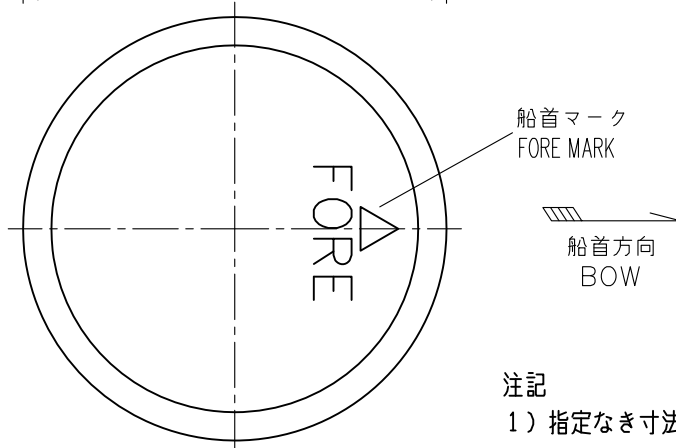
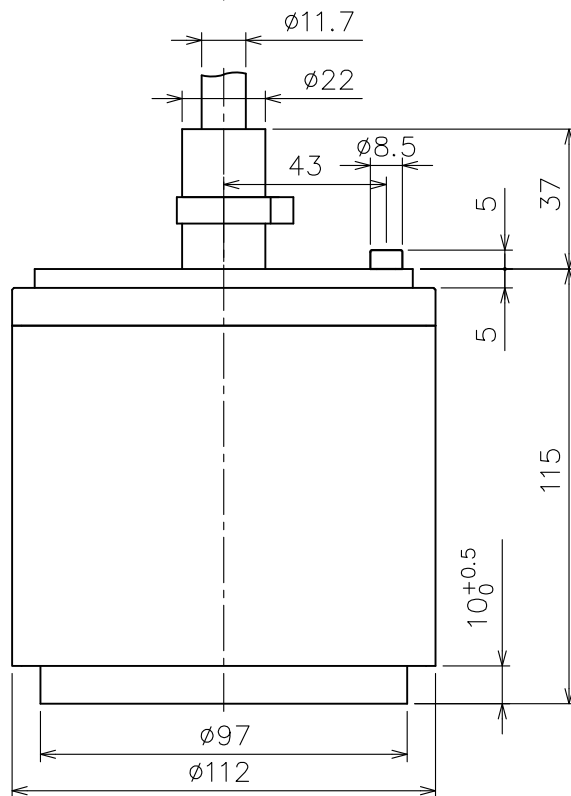


表 1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$

表 2 TABLE 2

ケーブル長 (m) CABLE LENGTH	質量 (kg $\pm 10\%$ ) MASS
31	9
41	11
51	13
61	14



注記

1) 指定なき寸法公差は表 1 による。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN	10/Jul/09 T.YAMASAKI	TITLE	DS-630
CHECKED	10/Jul/09 T.TAKENO	名称	送受波器
APPROVED	14/Jul/09 R.Esumi	外寸図	
SCALE	1/2	NAME	TRANSDUCER
DWG. No.	C7264-G07- A	REF. No.	66-027-600G-0
			OUTLINE DRAWING

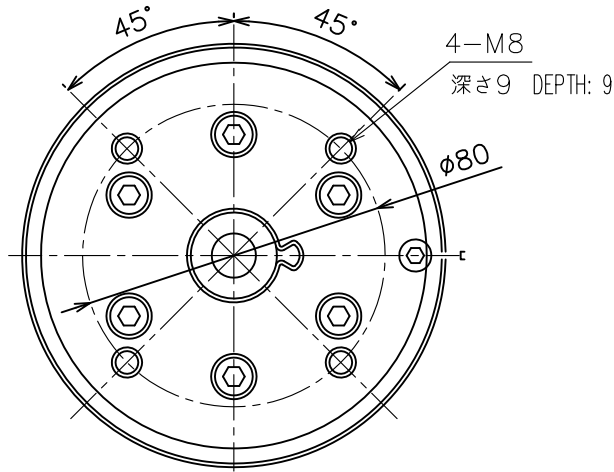
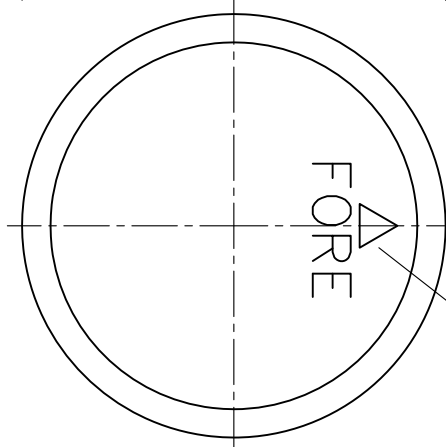
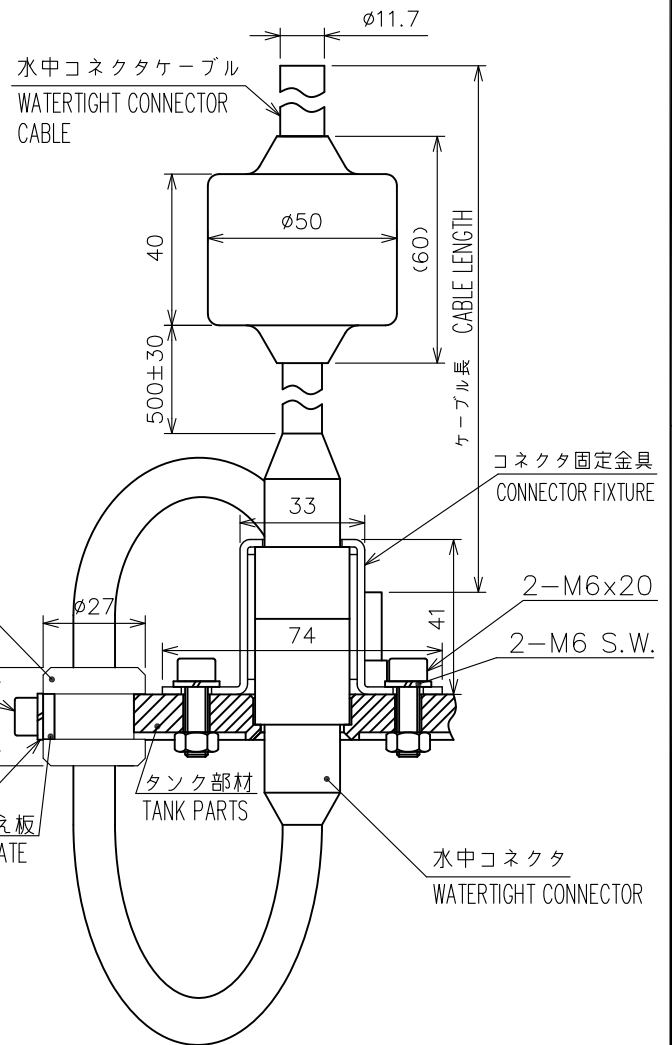
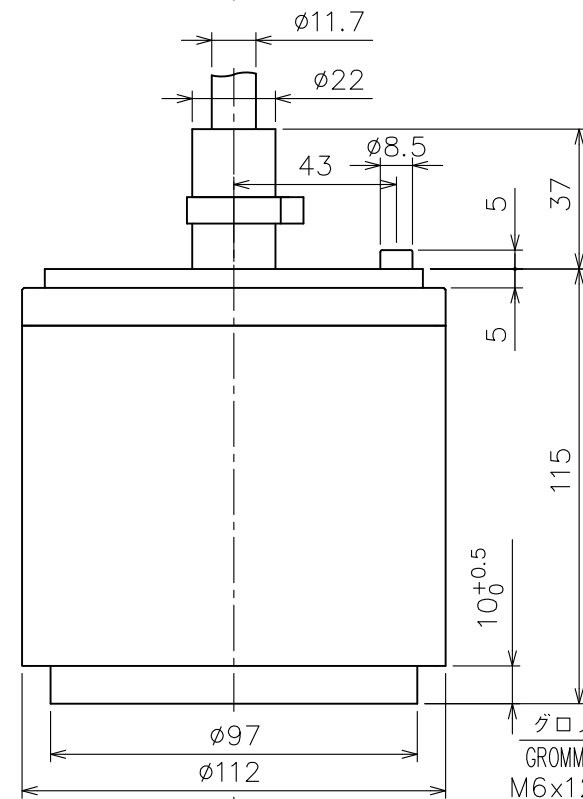


表 1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$

表 2 TABLE 2

ケーブル長 (m) CABLE LENGTH	質量 (kg $\pm 10\%$ ) MASS
31	9
41	11
51	13
61	14



注記

1) 指定なき寸法公差は表 1 による。

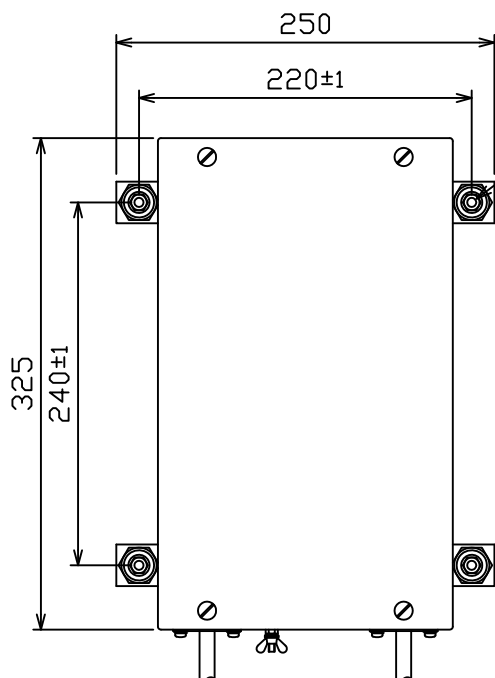
NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN	10/Jul/09 T.YAMASAKI	TITLE	DS-631
CHECKED	10/Jul/09 T.TAKENO	名称	送受波器
APPROVED	14/Jul/09 R.Esumi	外寸図	
SCALE	1/2	NAME	TRANSDUCER
DWG. No.	C7264-G08-A	OUTLINE DRAWING	

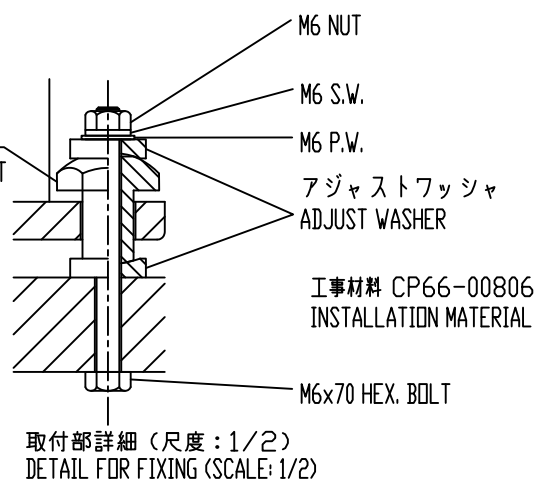
表 1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
$0 < L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$

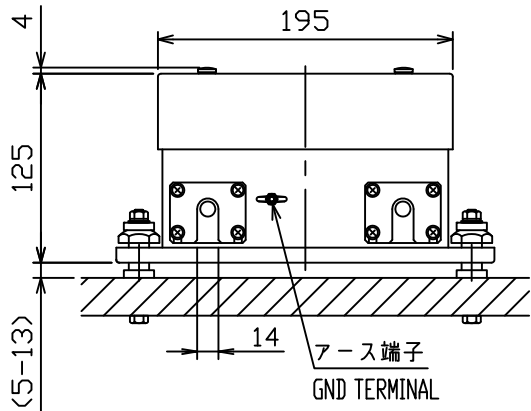


取付穴  
4-φ8  
FIXING HOLES

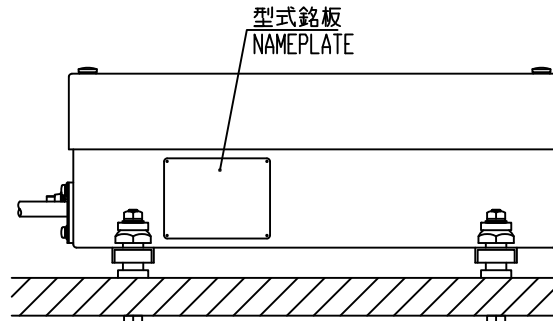
本体付属  
ATTACHED TO UNIT



取付部詳細 (尺度: 1/2)  
DETAIL FOR FIXING (SCALE: 1/2)



アース端子  
GND TERMINAL



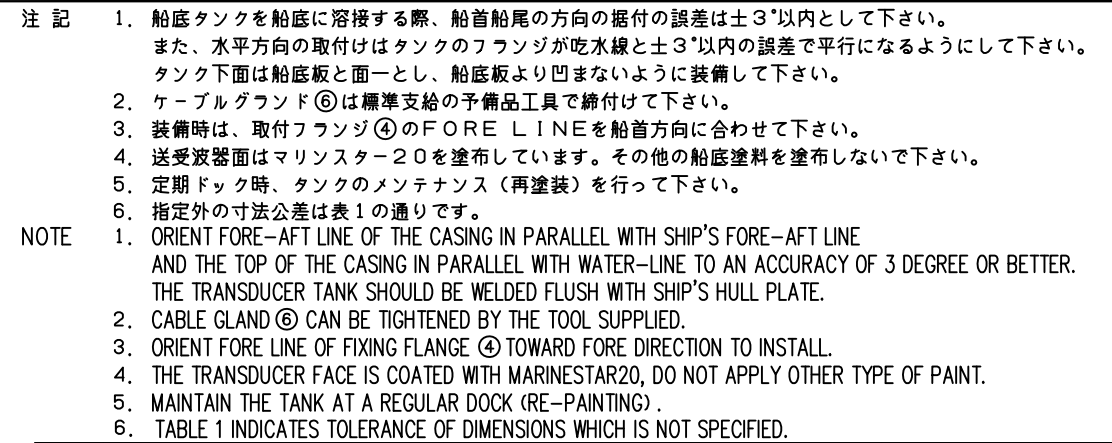
注記

- 1) 指定なき寸法公差は表 1 による。
- 2) 本装置は水平 ( $\pm 1^\circ$ ) となるように設置すること。

NOTE

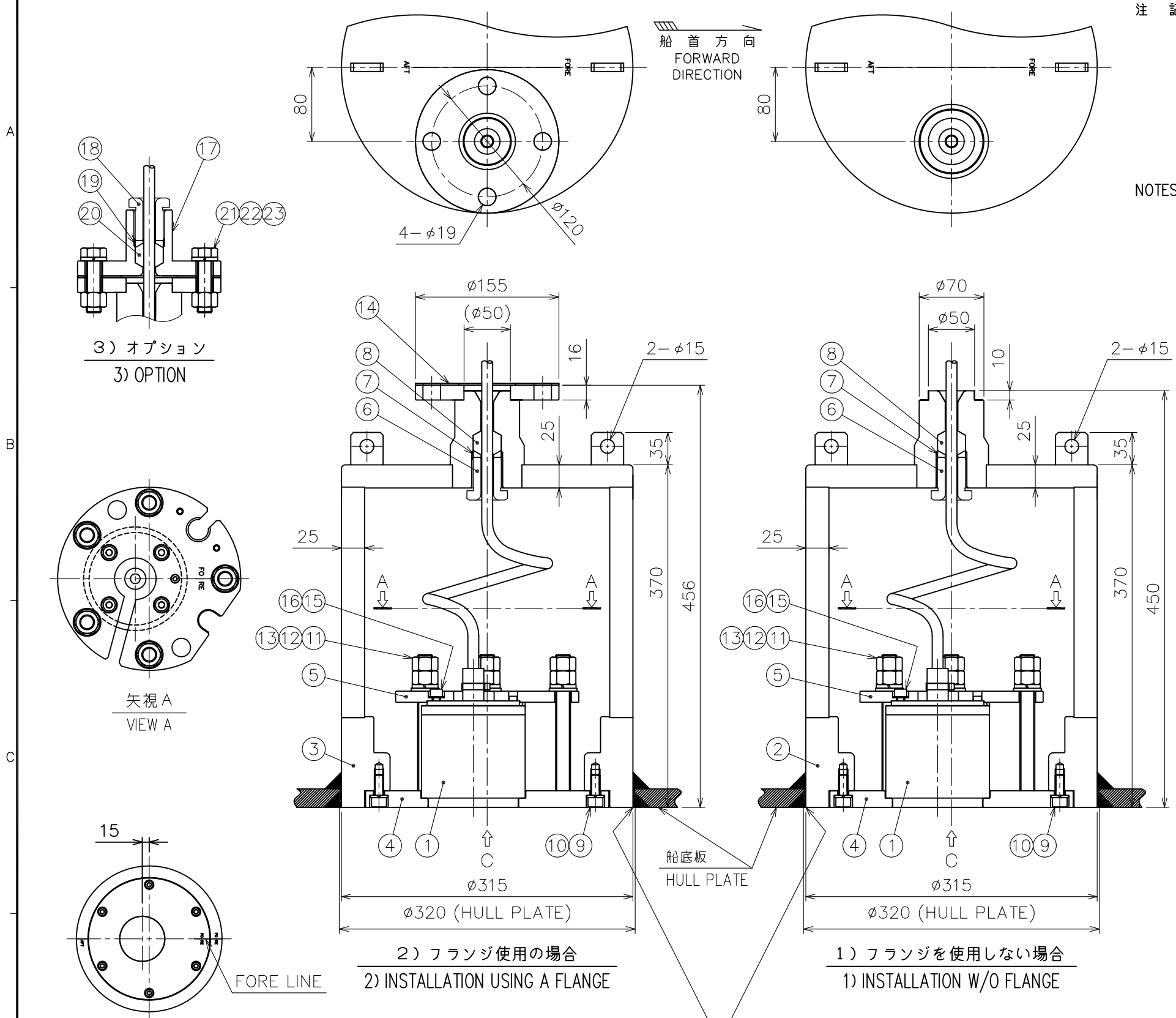
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. INSTALL THE UNIT HORIZONTAL LEVEL WITHIN  $\pm 1^\circ$ .

DRAWN	25/Sep/09 T.YAMASAKI	TITLE	DS-340
CHECKED	25/Sep/09 T.TAKENO	名称	レートジャイロ変換器 (卓上装備)
APPROVED	26/Oct/09 R.Esumi	DS-30	外寸図
SCALE	1/5	質量 6.0 ±10% kg	NAME
DWG.No.	C7236-G07-F	質量は工材を含まず MASS W/O INST. MATERIAL	RATE-OF-TURN GYRO (TABLETOP MOUNT)
		REF.No. 66-019-6000-G0	OUTLINE DRAWING



29	六角ナット HEX. NUT	SUS316L	(4)	M16	オプション OPTION
28	バネ座金 SPRING WASHER	SUS316L	(4)	M16	オプション OPTION
27	六角ボルト HEX. BOLT	SUS316L	(4)	M16X60	オプション OPTION
26	パッキン PAKING	CR	(1)	66-027-7007	オプション OPTION
25	座金 WASHER	SUS316L	(1)	66-027-7006	オプション OPTION
24	締付グラウンド FIXING GRAND	SUS316L	(1)	66-027-7005	オプション OPTION
23	フランジ FLANGE ZINC RICH PRIMER	SS400	(1)	66-027-7011	オプション OPTION
22	バネ座金 SPRING WASHER	SUS316L	2	M6	送受波器付属品 TRANSDUCER ACCESSORY
21	六角穴付ボルト HEX.S.H.C.SCREW	SUS316L	2	M6X20	送受波器付属品 TRANSDUCER ACCESSORY
20	コネクタ固定金具 CONNECTOR FIXING PLATE	SUS316L	1	66-027-6019	送受波器付属品 TRANSDUCER ACCESSORY
19	バネ座金 SPRING WASHER	SUS316L	2	M5	送受波器付属品 TRANSDUCER ACCESSORY
18	六角ボルト HEX. BOLT	SUS316L	2	M5X12	送受波器付属品 TRANSDUCER ACCESSORY
17	ケーブル押え板 CABLE FIXING PLATE	SUS316L	1	66-027-6020	送受波器付属品 TRANSDUCER ACCESSORY
16	シールワッシャー SEAL WASHER	SUS304	4	W8	送受波器付属品 TRANSDUCER ACCESSORY
15	六角穴付ボルト HEX.S.H.C.SCREW	SUS316L	4	M8X12	送受波器付属品 TRANSDUCER ACCESSORY
14	ガスケット GASKET	NON-ASBESTOS JOINT SHEET	1	10K-50A	
13	平座金 FLAT WASHER	SUS316L	5	M16	
12	バネ座金 SPRING WASHER	SUS316L	5	M16	
11	六角ナット HEX. NUT	SUS316L	10	M16	
10	バネ座金 SPRING WASHER	SUS316L	6	M10	
9	六角穴付ボルト HEX.S.H.C.SCREW	SUS316L	6	M10X25	
8	パッキン PAKING	CR	1	66-027-7007	
7	座金 WASHER	SUS316L	1	66-027-7006	
6	締付グラウンド FIXING GRAND	SUS316L	1	66-027-7005	
5	押え板 FIXING PLATE ZINC RICH PRIMER	SS400	1	66-027-7004	
4	取付フランジ FIXING FLANGE ZINC RICH PRIMER	SS400	1	66-027-7003	
3	フランジ付きタンク本体 CASING WITH FRANGE ZINC RICH PRIMER	KA/KSTPG370	1	66-027-7002	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
2	タンク本体 CASING ZINC RICH PRIMER	KA/KSTPG370	1	66-027-7001	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
1	送受波器 TRANSDUCER		1	DS-631	
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.No.	摘要 REMARKS

ITEM		NAME	MATERIAL	QTY	DWG.NO.	REMARKS
DRAWN	25/Nov/08 T.YAMASAKI		TITLE	DS-660		
CHECKED	25/Nov/08 T.TAKENO		名称	船底タンク（水中コネクタ付）		
APPROVED	9/Dec/08 R.Esumi	DS-60	送受波器装備図			
SCALE	1/5	MASS 1) 96 ±10% 2) 100 kg	質量は、送受波器とオプションを除く MASS W/O TRANSDUCER AND OPTION	NAME	TRANSDUCER TANK (W/ WATERTIGHT CONNECTOR)	
DWG. No.	C7264-T01-A	REF. No.	66-027-700G-I	TRANSDUCER INSTALLATION		



- 注 記
- 1. 船底タンクを船底に溶接する際、船首船尾の方向の据付の誤差は±3°以内として下さい。  
また、水平方向の取付けはタンクのフランジが吃水線と±3°以内の誤差で平行になるようにして下さい。  
タンク下面は船底板と面一とし、船底板より凹まないように装備して下さい。
  - 2. ケーブルグラウンド⑥は標準支給の予備品工具で締付けて下さい。
  - 3. 装備時は、取付フランジ④のFORE LINEを船首方向に合わせて下さい。
  - 4. 送受波器面はマリンスター20を塗布しています。その他の船底塗料を塗布しないで下さい。
  - 5. 定期ドック時、タンクのメンテナンス（再塗装）を行って下さい。
  - 6. 指定外の寸法公差は表1の通りです。

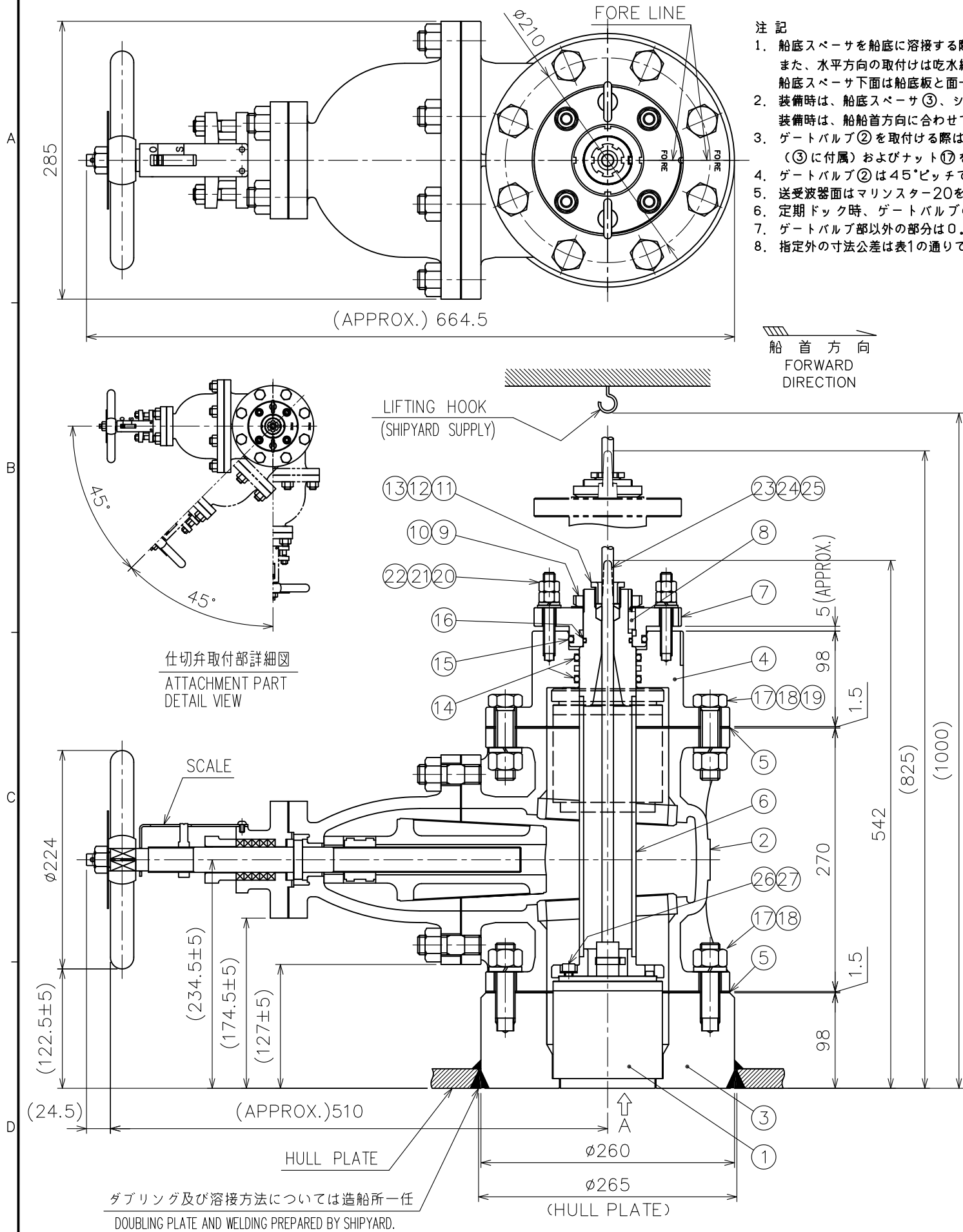
- NOTES
- 1. ORIENT FORE-AFT LINE OF THE CASING IN PARALLEL WITH SHIP'S FORE-AFT LINE AND THE TOP OF THE CASING IN PARALLEL WITH WATER-LINE TO AN ACCURACY OF 3 DEGREE OR BETTER. THE TRANSDUCER TANK SHOULD BE WELDED FLUSH WITH SHIP'S HULL PLATE.
  - 2. CABLE GLAND ⑥ CAN BE TIGHTENED BY THE TOOL SUPPLIED.
  - 3. ORIENT FORE LINE OF FIXING FLANGE ④ TOWARD FORE DIRECTION TO INSTALL.
  - 4. THE TRANSDUCER FACE IS COATED WITH MARINESTAR20, DO NOT APPLY OTHER TYPE OF PAINT.
  - 5. MAINTAIN THE TANK AT A REGULAR DOCK (RE-PAINTING).
  - 6. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

23	六角ナット HEX. NUT	SUS316L	(4)	M16	オプション OPTION
22	バネ座金 SPRING WASHER	SUS316L	(4)	M16	オプション OPTION
21	六角ボルト HEX. BOLT	SUS316L	(4)	M16X60	オプション OPTION
20	パッキン PAKING	CR	(1)	66-027-7007	オプション OPTION
19	座金 WASHER	SUS316L	(1)	66-027-7006	オプション OPTION
18	締付グラウンド FIXING GRAND	SUS316L	(1)	66-027-7005	オプション OPTION
17	フランジ FLANGE ZINC RICH PRIMER	SS400	(1)	66-027-7011	オプション OPTION
16	シールワッシャー SEAL WASHER	SUS304	4	W8	送受波器付属品 TRANSDUCER ACCESSORY
15	六角穴付ボルト HEX.S.H.C.SCREW	SUS316L	4	M8X12	送受波器付属品 TRANSDUCER ACCESSORY
14	ガスケット GASKET	NON-ASBESTOS JOINT SHEET	1	10K-50A	
13	平座金 FLAT WASHER	SUS316L	5	M16	
12	バネ座金 SPRING WASHER	SUS316L	5	M16	
11	六角ナット HEX. NUT	SUS316L	10	M16	
10	バネ座金 SPRING WASHER	SUS316L	6	M10	
9	六角穴付ボルト HEX.S.H.C.SCREW	SUS316L	6	M10X25	
8	パッキン PAKING	CR	1	66-027-7007	
7	座金 WASHER	SUS316L	1	66-027-7006	
6	締付グラウンド FIXING GRAND	SUS316L	1	66-027-7005	
5	押え板 FIXING PLATE ZINC RICH PRIMER	SS400	1	66-027-7004	
4	取付フランジ FIXING FLANGE ZINC RICH PRIMER	SS400	1	66-027-7003	
3	フランジ付きタンク本体 CASING WITH FRANGE ZINC RICH PRIMER	KA/KSTPG370	1	66-027-7002	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
2	タンク本体 CASING ZINC RICH PRIMER	KA/KSTPG370	1	66-027-7001	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
1	送受波器 TRANSDUCER		1	DS-630	
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.No.	摘要 REMARKS

表1 (Table1)

寸法区分 (mm) Dimension	公差 (mm) Tolerance
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

DRAWN	25/Nov/08 T.YAMASAKI		TITLE	DS-660	
CHECKED	25/Nov/08 T.TAKENO		名称	船底タンク（水中コネクタなし）	
APPROVED	9/Dec/08 R.Esumi	DS-60		送受波器装備図	
SCALE	1/5	MASS 1) 96 ±10% 2) 100 kg	質量は、送受波器とオプションを除く MASS W/O TRANSDUCER AND OPTION	NAME	TRANSDUCER TANK (W/O WATERTIGHT CONNECTOR)
DWG. No.	C7264-T02-A	REF. No.	66-027-710G-I		TRANSDUCER INSTALLATION

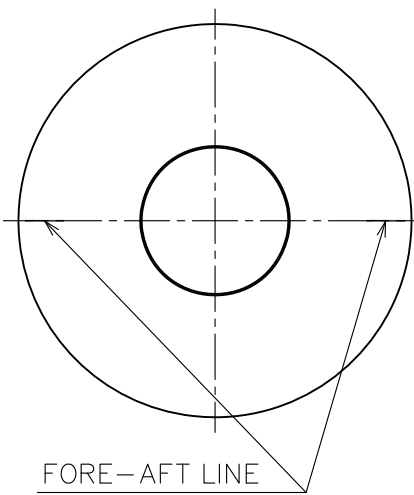


- 注 記
1. 船底スペースを船底に溶接する際、船首船尾の方向の据付の誤差は±3°以内として下さい。  
また、水平方向の取付けは吃水線と±3°以内の誤差で平行になるようにして下さい。  
船底スペース下面は船底板と面一とし、船底板より凹まないように装備して下さい。
  2. 装備時は、船底スペース③、シーチェストキャップ④ およびフランジ⑦のFORE LINEを  
装備時は、船舶首方向に合わせて下さい。
  3. ゲートバルブ②を取付ける際はナット①⑦の回り止め対策として、ボルト①⑨、寸切りボルト  
(③に付属) およびナット①⑦を脱脂後、ロックタイト#271を塗布して完全に締めてください。
  4. ゲートバルブ②は45°ピッチで任意の方向に取付け可能です。
  5. 送受波器面はマリンスター20を塗布しています。その他の船底塗料を塗布しないで下さい。
  6. 定期ドック時、ゲートバルブのメンテナンス(再塗装)を行って下さい。
  7. ゲートバルブ部以外の部分は0.5MPaの水圧試験がされています。
  8. 指定外の寸法公差は表1の通りです。

- NOTE
1. ORIENT FORE-AFT LINE OF THE SPACER IN PARALLEL WITH SHIP'S FORE-AFT LINE AND THE TOP OF  
SPACER IN PARALLEL WITH WATER-LINE TO AN ACCURACY OF 3 DEGREE OR BETTER.  
THE SPACER SHOULD BE WELDED FLUSH WITH SHIP'S HULL PLATE.
  2. ORIENT FORE LINES OF SPACER ③, SEACHEST CAP ④ AND FLANGE ⑦ TO FORWARD TO INSTALL.
  3. CLEAN NUTS ① AND BOLTS WITH SOLVENT, COAT THEIR THREADS WITH ADHESIVE/SEALANT (LOCTITE#271)  
AND THEN TIGHTEN THEM SECURELY WHEN MOUNTING GATE VALVE ②.
  4. GATE VALVE ② CAN BE ATTACHED IN THE ANY DIRECTION IN INCREMENT OF 45°.
  5. THE TRANSDUCER FACE IS COATED WITH MARINESTAR20, DO NOT APPLY OTHER TYPE OF PAINT.
  6. MAINTAIN THE GATE VALVE AT A REGULAR DOCK (RE-PAINTING).
  7. SEACHEST EXCEPT GATE VALVE IS TESTED UNDER 0.5MPa WATER PRESSURE.
  8. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

表1 (Table1)

寸法区分 (mm) Dimension	公差 (mm) Tolerance
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3
500 < L ≤ 1000	±4



27	シールワッシャー SEAL WASHER	SUS304	4	W8	送受波器付属品 TRANSDUCER ACCESSORY
26	六角穴付ボルト HEX.S.H.C.SCREW	SUS316L	4	M8X12	送受波器付属品 TRANSDUCER ACCESSORY
25	アイナット EYENUT	SUS304	2	M10	
24	バネ座金 SPRING WASHER	SUS316L	2	M10	
23	六角穴付ボルト HEX.S.H.C.SCREW	SUS316L	2	M10X25	
22	平座金 FLAT WASHER	SUS316L	4	M12	
21	バネ座金 SPRING WASHER	SUS316L	4	M12	
20	六角ナット HEX. NUT	SUS316L	8	M12	
19	六角ボルト HEX. BOLT	SUS316L	8	M20X75	
18	バネ座金 SPRING WASHER	SUS316L	16	M20	
17	六角ナット HEX. NUT	SUS316L	16	M20	
16	Oリング O-RING	NBR	1	JIS B 2401 P44	
15	Oリング O-RING	NBR	1	JIS B 2401 P70	
14	Oリング O-RING	NBR	2	JIS B 2401 P58	
13	パッキン PAKING	CR	1	66-027-7207	
12	座金 WASHER	SUS316L	1	66-027-7206	
11	締付グラウンド FIXING GRAND	C3604B	1	JIS F 8801 20 1a	
10	座金 WASHER	SS400	1	AW10	
9	ナット NUT	SS400	1	AN10	
8	キー TURNING STOPPER	SUS304	1	JIS B 1301 P-B 8X7X18	
7	フランジ FLANGE	SS400	1	66-027-7205	
6	シャフト SHAFT	SUS316L	1	66-027-7204	
5	ガスケット GASKET	NON-ASBESTOS JOINT SHEET	2	66-027-7203	
4	シーチェストキャップ SEACHEST CAP ZINC RICH PRIMER	KA	1	66-027-7202	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
3	船底スペース SPACER ZINC RICH PRIMER	KA	1	66-027-7201	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
2	船用錆鋼仕切弁 GATE VALVE ZINC RICH PRIMER	SC480	1	66-027-7211 (JIS F 7366-125S)	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
1	送受波器 TRANSDUCER		1	DS-630	質量に含まず NOT INCLUDED IN MASS
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.No.	摘要 REMARKS

DRAWN	25/Nov/08 T.YAMASAKI		TITLE	DS-661
CHECKED	25/Nov/08 T.TAKENO		名称	ゲートバルブ
APPROVED	9/Dec/08 R.Esumi	DS-60		送受波器装備図
SCALE	1/5	MASS ±10% 120 kg	質量は、送受波器を含まず MASS W/O TRANSDUCER	NAME GATE VALVE
DWG. No.	C7264-T03- A	REF. No.	66-027-720G-H	TRANSUCER INSTALLATION



A

B

C

D

送受波器  
TRANSDUCER  
DS-630/631

## 注記

- \* 1) 造船所手配。
- \* 2) オプション。

## NOTE

- \*1: SHIPYARD SUPPLY.
- \*2: OPTION.

CO-0. 2x5P: CO-SPEVV-SB-C 0. 2x5P,  $\phi$  13.5

DRAWN	26/Mar/2010 T. YAMASAKI	TITLE	DS-60
CHECKED	26/Mar/2010 T. TAKAHASHI	名称	ドップラソナー
APPROVED	26/Mar/2010 Y.NISHIYAMA		相互結線図
SCALE	MASS kg	NAME	DOPPLER SONAR
DWG No.	G7264-C01- D	REF. No.	66-031-0001-0
INTERCONNECTION DIAGRAM			

FURUNO ELECTRIC CO., LTD.

